The RUBBER AGE

January, 1947

R. T. VANDERBILT CO. N.Y. AMERICAN PRODUCTS

COATING MATERIALS

Paint on the

Extras

That You Can't Build in

Van-Wax

For Protection and Appearance

or

Black-Out

Outstanding Resistance to

Weather · Alkali · Acid · Ozone-Oil

R. T. VANDERBILT CO., INC.

230 Park Avenue · New York 17, N. Y.

For Processing Safety...

USE THIONEX ACCELERATOR

TEST DATA

THIONEX ACCELERATED STOCKS

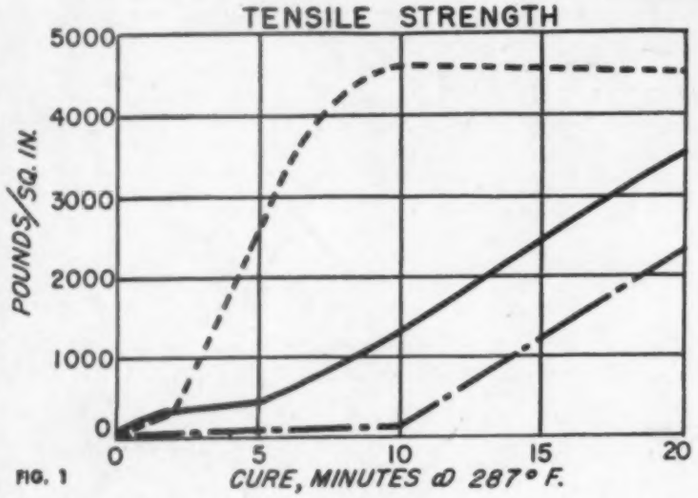


FIG. 1

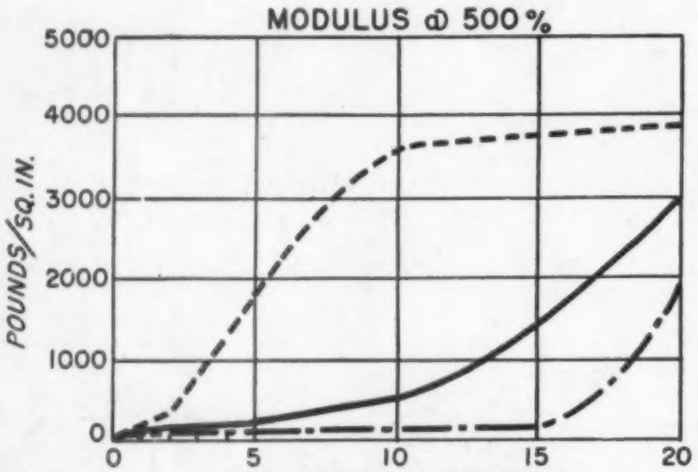


FIG. 2

NATURAL RUBBER - - - - - -
50-50 MIXTURE GRS & NAT. RUBBER ——
GRS — - — - —

Delayed Action at Curing Temperature Emphasizes Its Advantage In Rubber and GR-S Stocks

Thionex offers important advantages as an accelerator for natural rubber, GR-S and mixtures of these elastomers.

Outstanding property of Thionex is delayed acceleration . . . a timed action that starts only when the temperature of the stock reaches curing range. Test results show that on specimens cured at 287°F., Thionex does not begin to activate the cure for several minutes. But when the test pieces have been heated long enough to reach curing temperature, rate of cure is rapidly accelerated. These properties—delayed action and fast rate of cure—are graphically shown in Figures 1 and 2.

The delayed action of Thionex emphasizes its processing safety. Compounds may be exposed to temperatures approaching the curing range for short periods of time without danger of setting up during milling, calendering or extruding. And in the production of complicated molded goods, stocks accelerated with Thionex flow evenly—completely fill all sections of the mold before vulcanization begins.

That is why manufacturers have found Thionex so valuable in the production of wire insulation, molded goods, drug sundries, hose, heels and soles, tires and many other rubber products. Write us for detailed information on the use of Thionex in your products.

TABLE 1
Composition of stocks used in preparing test data

Stock No. 1527—	10	11	B12
Smoked Sheets	100.0	50.0	
GR-S		50.0	100.0
Zinc Oxide	5.0	5.0	5.0
Stearic Acid	1.0	1.0	1.0
Sulfur	2.0	2.0	2.0
EPC Carbon Black	50.0	50.0	50.0
THIONEX	0.3	0.35	0.4

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co., (Inc.), Wilmington 98, Del.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

DU PONT

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. January, 1947. Vol. 60, No. 4.

★ EXCELLENT ★
AGE RESISTANCE

RESILIENT parts made from HYCAR American rubber resist the aging effects of air, sunlight, ozone, heat, cold, and all other types of oxidation. That's why they *stay* resilient—and stay on the job for a long, long time.

Other important properties of HYCAR American rubber are shown in the box at the right. And it's important to know that these properties may be had in an almost limitless number of combinations—each compounded to meet a given set of service conditions.

We make no finished products of HYCAR. But we urge you to ask your supplier for parts made from this versatile material. You'll learn for yourself that it's wise to use HYCAR—in difficult or routine applications—for long-time, dependable performance. For more information, please write Dept. HB-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

CHECK THESE SUPERIOR FEATURES OF HYCAR

1. EXTREME OIL RESISTANCE — insuring dimensional stability of parts.
2. HIGH TEMPERATURE RESISTANCE—up to 250° F. dry heat; up to 300° F. hot oil.
3. ABRASION RESISTANCE—50% greater than natural rubber.
4. MINIMUM COLD FLOW—even at elevated temperatures.
5. LOW TEMPERATURE FLEXIBILITY — down to —65° F.
6. LIGHT WEIGHT—15% to 25% lighter than many other synthetic rubbers.
7. AGE RESISTANCE—exceptionally resistant to checking or cracking from oxidation.
8. HARDNESS RANGE—compounds can be varied from extremely soft to bone hard.
9. NON-ADHERENT TO METAL—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

Hycar
Reg. U. S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE brand chemicals

This advertisement appeared in a long list of carefully selected business papers TO HELP YOU SELL parts made from HYCAR.

REMOVE THE NERVE THE EASY WAY . . . USE PHILBLACK A!

There are certain problems every manufacturer of rubber products has to struggle with. "Removing the nerve" is one which Philblack A solves easily.

You know that Philblack A is the sure way to easier and faster processing . . . speeds up mixing cycles and lowers your processing time!

And, when you're thinking about the *finished* product, just consider the advantages Philblack A offers you . . . high hot tensile . . . good heat and electrical conductivity . . . excellent resistance to abrasion . . . and high resilience.

PHILLIPS PETROLEUM COMPANY

Philblack Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

They look good enough to eat in

Colorful upholstery is another interesting application for GEON polyvinyl raw materials

THOSE handsome dining room chairs are upholstered with a flexible plastic sheet made from one of the GEON polyvinyl resins. Lovely to look at, the upholstery offers many extremely practical advantages, too. Resistance to wear, for example, is just one of a long list that includes resistance to foods, dirt, oils, greases, water, heat, cold, fading, aging, and most other normally destructive factors. The material is easily cleaned with soap and water.

These properties, plus many others, have made versatile GEON the ideal material for literally hundreds of products in the home and in industry —shower curtains and fly swatters— draperies and floor tiles — clothing and luggage — wire insulation and acid tank linings.

And GEON can be pressure or injection molded, extruded, calendered or cast into sheet or film. In solution or latex forms it can be applied as coatings for fabrics and fibres of all kinds as well as for paper and cardboard. Products made from GEON may be flexible or rigid, clear or opaque, brilliantly or delicately colored.

Other raw materials made by B. F. Goodrich Chemical Company include HYCAR American rubber, KRISTON thermosetting resins, and GOOD-RITE brand chemicals. While we make no finished products, we'll be glad to help with special problems or applications. For more information, please write Dept. R-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE brand chemicals

For technical data please write Dept. CB-1

B. F. Goodrich Chemical Company

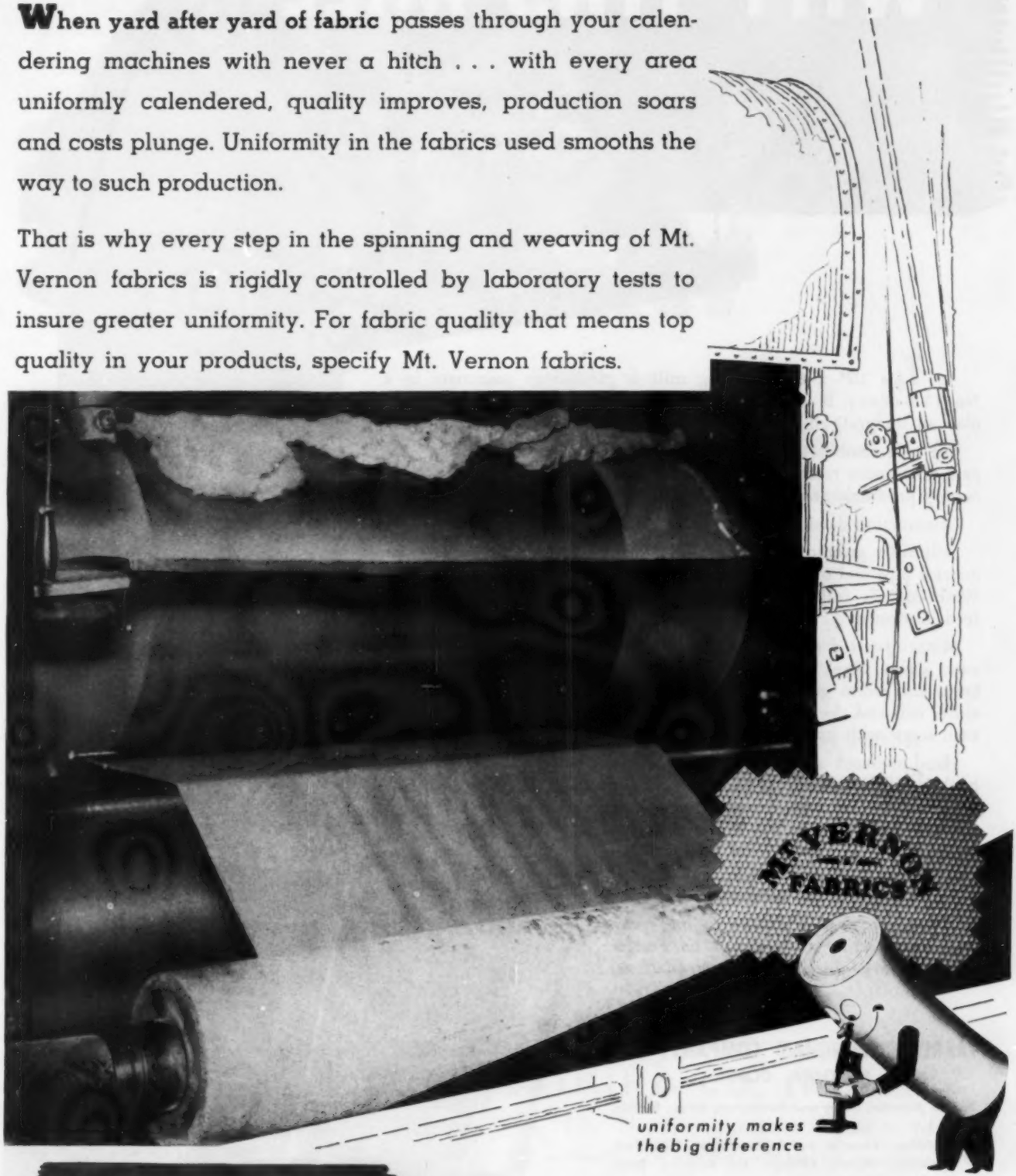
A DIVISION OF
THE B. F. GOODRICH COMPANY

ROSE BUILDING, CLEVELAND 15, OHIO

Fabric Uniformity Smooths the Way

When yard after yard of fabric passes through your calendering machines with never a hitch . . . with every area uniformly calendered, quality improves, production soars and costs plunge. Uniformity in the fabrics used smooths the way to such production.

That is why every step in the spinning and weaving of Mt. Vernon fabrics is rigidly controlled by laboratory tests to insure greater uniformity. For fabric quality that means top quality in your products, specify Mt. Vernon fabrics.



TURNER HALSEY
COMPANY
Selling Agents
40 WORTH ST. • NEW YORK

Mt. Vernon-Woodberry Mills

Branch Offices: CHICAGO • NEW ORLEANS • ATLANTA • BALTIMORE • BOSTON • LOS ANGELES • AKRON

WHY THIS MILL

FITS INTO A PRODUCTION TEAM

This 26" x 84" sheeting mill is production teammate to a No. 11 Banbury. It is designed and custom-built to *fit the job* . . . to play an integral, efficiency-improving part in a rubber-making team.

The mill combines basic design principles, proven successful in the past, with more recently improved features that have also been thoroughly production-tested to prove their practical value.

Construction details include:

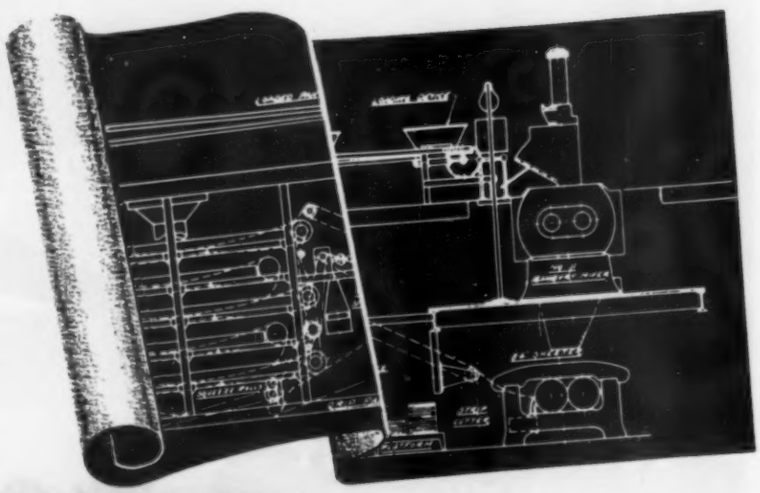
Mill rolls ground on bodies and journals, cored and fitted with interior pipe and overflow nozzles for the circulation of cooling water. Water-cooled, full bronze-lined journal boxes automatically force-feed lubricated.

Motor-operated adjustment of the front roll for accurate setting to exact guage. Steel adjusting screws driven by separate motor through bevel and worm gearing. Clutches permit independent adjustment of either roll end. Swivel, shear-pin type breaker with pull-back connects each screw with its journal box.

Hand-operated strip cutter with two adjustable knives; swinging bank board mounted over the rear roll; self-adjusting guides; cut spur gears, bath-lubricated in oiltight guards; individual motor drive through enclosed reduction unit; cast Meehanite housings and stringer bedplates of extra heavy proportions, are some of the other features of this F-B production unit.

When you need a mill to fit into your production set-up exactly, call on Farrel-Birmingham engineers for recommendations.

FB-344



FARREL - BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte.

Farrel-Birmingham

you get up to
30% CARBON BLACK CONTENT
in *Buffalo Reclaims!*

Just another reason why BUFFALO RECLAIMS are widely used by rubber compounders—the carbon black content is *high*. From the figures below, you'll see how BUFFALO can help you during the current carbon black shortage!

BUFFALO RECLAIMS	Carbon Black Content	Specific Gravity
8022 Tank Tread Reclaim	30%	1.25
SPECIAL 33 Natural #1 Peel Type	27%	1.16
U. S. 140 GRS Whole Tire Reclaim	23%	1.17

U. S. RUBBER RECLAIMING CO., INC.

500 FIFTH AVENUE • NEW YORK 18, N. Y. • (Plant at Buffalo, N. Y.)

TRENTON . . . H. M. ROYAL, Inc., 689 Pennington Avenue • TORONTO . . . H. VAN DER LINDE, Ltd., 156 Yonge Street

64 Years Serving the Industry Solely as Reclaimers

SPECIALISTS...

in Time and Place!

MODERN BUSINESS demands the employment of dependable specialists wherever and whenever possible.

Our customers' exacting needs have helped shape us into specialists in the art of getting the right materials to the right place on time...*what you need when you need it.*

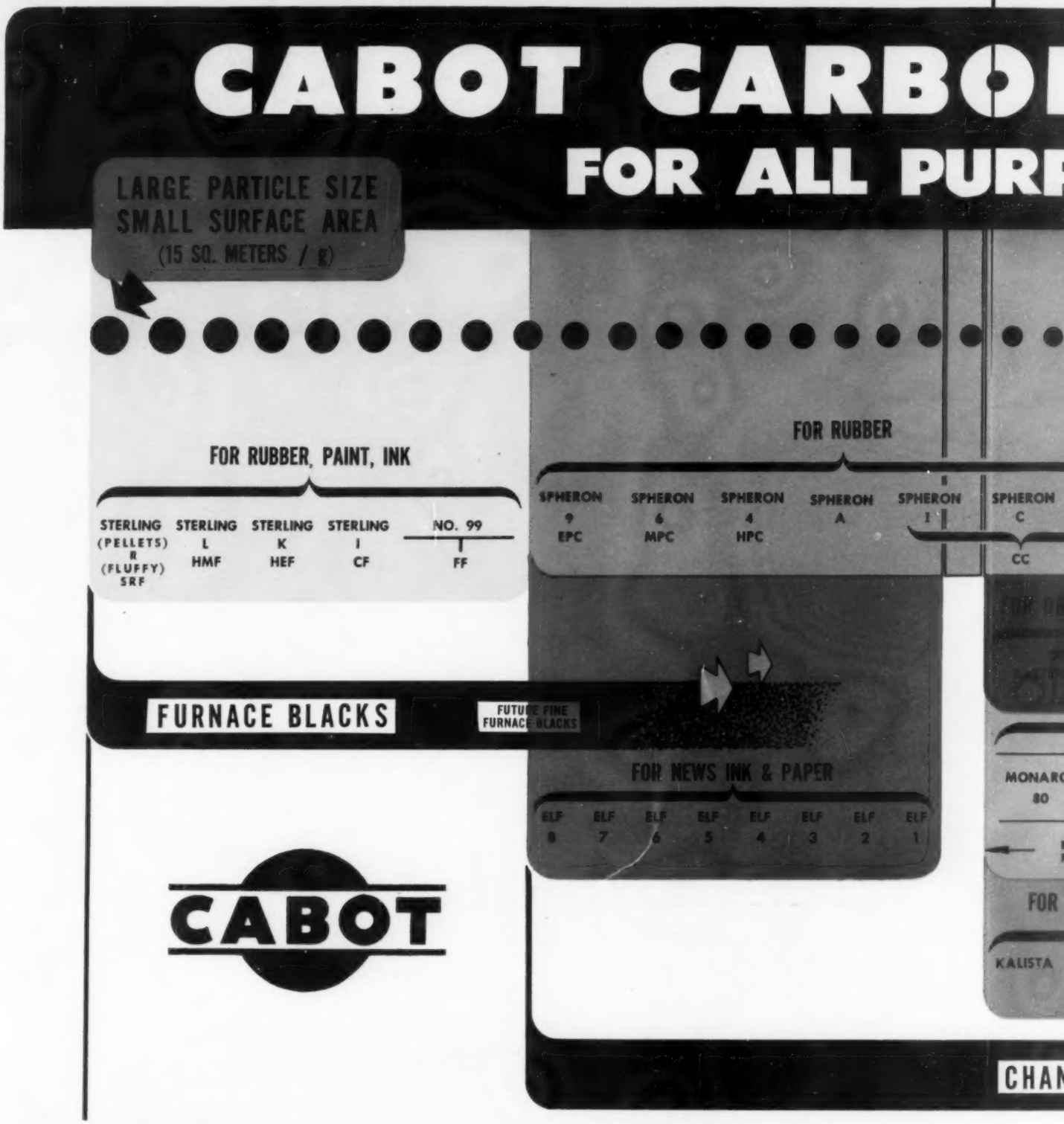
It is this type of reliability, which only years of conscientious effort can truly develop, which characterizes the friendly customer-relationship that we have maintained for over 40 years.

H. MUEHLSTEIN & CO. INC.

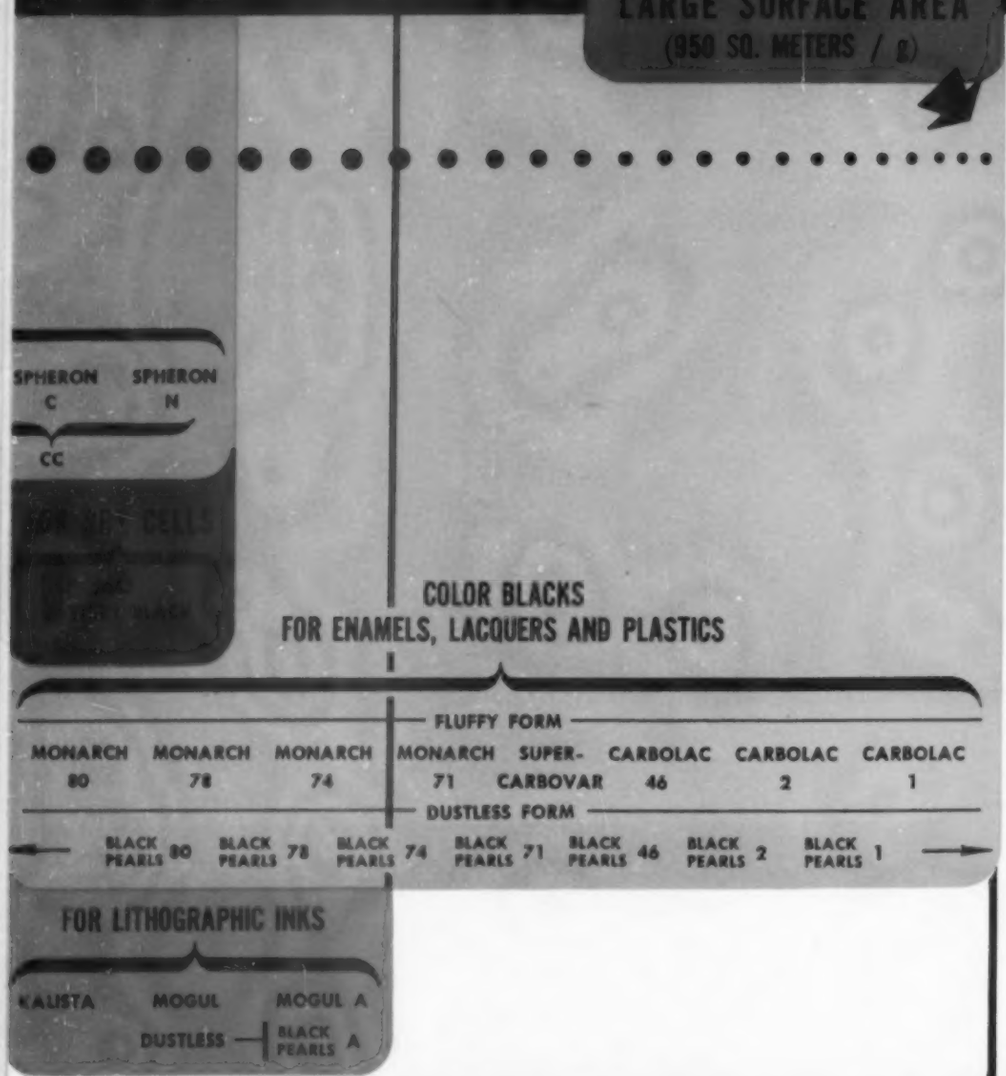
122 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: New York • Akron • Chicago • Boston • Los Angeles • Memphis

WAREHOUSES: Jersey City • Akron • Boston • Los Angeles • Memphis


CABOT CARBO
FOR ALL PURP
LARGE PARTICLE SIZE
SMALL SURFACE AREA
(15 SQ. METERS / g)
FOR RUBBER, PAINT, INK
STERLING (PELLETS) R (FLUFFY) SRF
STERLING L HMF
STERLING K HEF
STERLING I CF
NO. 99 T FF
FOR RUBBER
SPHERON 9 EPC
SPHERON 6 MPC
SPHERON 4 HPC
SPHERON A
SPHERON I
SPHERON C
CC
FURNACE BLACKS
FUTURE FINE FURNACE BLACKS
FOR NEWS INK & PAPER
ELF 8
ELF 7
ELF 6
ELF 5
ELF 4
ELF 3
ELF 2
ELF 1
MONARC 80
FOR
KALISTA
CABOT
CHAN
RUBBER BLACKS
EASY PROCESSING
HIGH RESILIENCE
LOW ABRASION RESISTANCE
LOW TENSILE
LOW HEAT GENERATION
PROPERTIES VARY ALONG THIS LINE AS PARTICLE SIZE BECOMES SMALLER
HARD PROCESSING
LOW RESILIENCE
EXCELLENT ABRASION RE
HIGH TENSILE
HIGH HEAT GENERATION
INK AND COLOR BLACKS
GREY—BLACK COLOR
LOW OIL ABSORPTION
BLUE UNDERTONE
LONG FLOW
LOW TONER &
DRYER ABSORPTION
PROPERTIES VARY ALONG THIS LINE AS PARTICLE SIZE BECOMES SMALLER

ON BLACKS
RPOSES



CHANNEL BLACKS

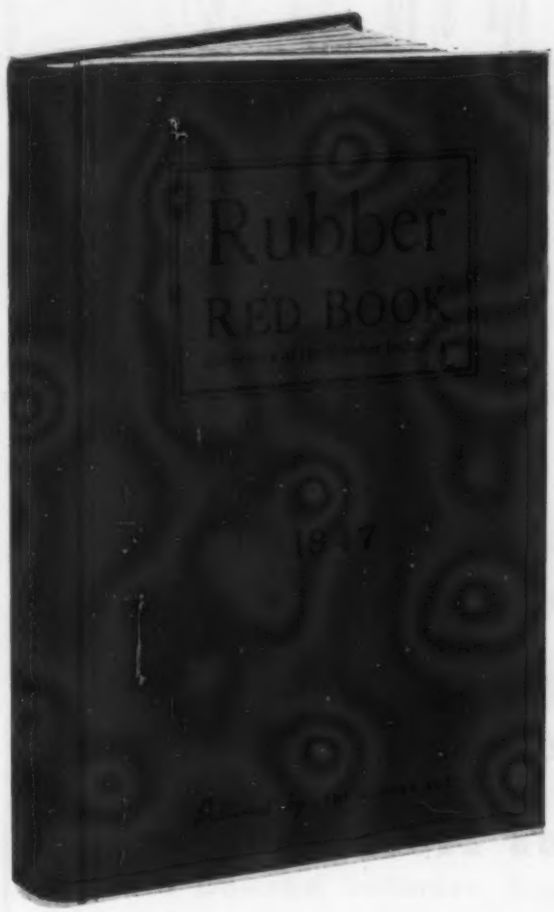
ESSING
ENCE
ABRASION RESISTANCE
LE
GENERATION

MES SMALLER

MORE INTENSE BLACK COLOR
HIGH OIL ABSORPTION
BROWN UNDERTONE
SHORT FLOW
HIGH TONER &
DRYER ABSORPTION

GODFREY L. CABOT, INC.
77 FRANKLIN ST., BOSTON 10, MASS.

Plan Now for Space in the 1947 RUBBER RED BOOK!



The Sixth Issue of the RUBBER RED BOOK —the 1947 Edition—will be published in July, 1947.

If you budget your advertising in advance, do not fail to include this outstanding Directory on your list . . . it is *not too early* to reserve space now for the coming year in this essential advertising medium!

The last issue of the RUBBER RED BOOK—the 1945 issue—was the largest ever published, with a total of 696 pages and 242 advertisers. The demand for that issue was so great that inside of three months the complete edition, limited to 3100 copies by paper restrictions, was completely exhausted!

There is, accordingly, a tremendous interest in the 1947 edition as further evidenced by the hundreds of advance orders already on hand. We will spare no effort to bring out the 1947 issue early and the press run will be increased to meet the steadily rising demand.

You, as an advertiser, can capitalize on this situation by making sure as soon as possible that you are represented with ample space in the 1947 edition.

The RUBBER RED BOOK is without a doubt the most indispensable and widely used book in the rubber industry today! It is consulted daily by the industry's key men—buyers, technologists, plant executives and many others—as their primary source of buying information.

What better place then, to tell the story of your products and services than in effective display advertising in the RUBBER RED BOOK? Plan now to use adequate space in the 1947 edition!

Despite higher production costs, we are determined to hold the line on prices as long as possible; therefore there will be no change in basic advertising rates over the 1945 edition. Color charges are however necessarily somewhat higher. (See accompanying box for condensed rate data).

Reserve your space today! Your advertisement in the 1947 edition will pay you dividends until 1949!

1947 EDITION
Cost of Space

1 page	$100.	2 pages	$190.
½ page	55.	2 half pages	106.
¼ page	30.	2 ¼ pages	58.
Colors — Red	extra,		40.
Other Colors	extra,		60.
Bleed Pages	extra,		20%

Inserts — Not Accepted

For complete rates and mechanical requirements, write for rate card

Published by

RUBBER AGE

250 W. 57th St., New York 19, N. Y.

A NEW WHITE
and
BRIGHT ***Pigment...***

WHITETEX

- **Can be used in pastel colors of rubber, synthetic rubber and plastics, especially vinyls.**

ALSO... **as an extender for Titanium Pigments, Lithopone, Zinc Oxide.**

WHITETEX has a G. E. brightness of 90-92 and very good visual color.

• SAMPLES UPON REQUEST •

MOORE & MUNGER

33 RECTOR STREET NEW YORK 6, N. Y.

Easy to Handle!

SUN RUBBER-PROCESSING AID...

Gives Desired Softness, Speeds Up Milling by 15%

A manufacturer of hose, gasketing, and other mechanical goods was using cottonseed and paraffin spindle oils as softening agents, but had considerable difficulty in getting the desired product softness.

A Sun Engineer recommended a specially refined Sun rubber-processing aid, a carefully selected group of hydrocarbons that have a natural affinity for rubber.

The desired softness of 20 on the Shor Durometer was readily obtained when the plant switched to this Sun "Job-Proved" material. The rubber was much easier to handle, and milling time was reduced by 15%, with savings in labor and power.

Sun rubber-processing aids are highly compatible with natural and synthetic rubbers. They eliminate blooming, cracking, hardening or bleeding. For modern "Job-Proved" rubber-processing aids, call your nearest Sun office.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

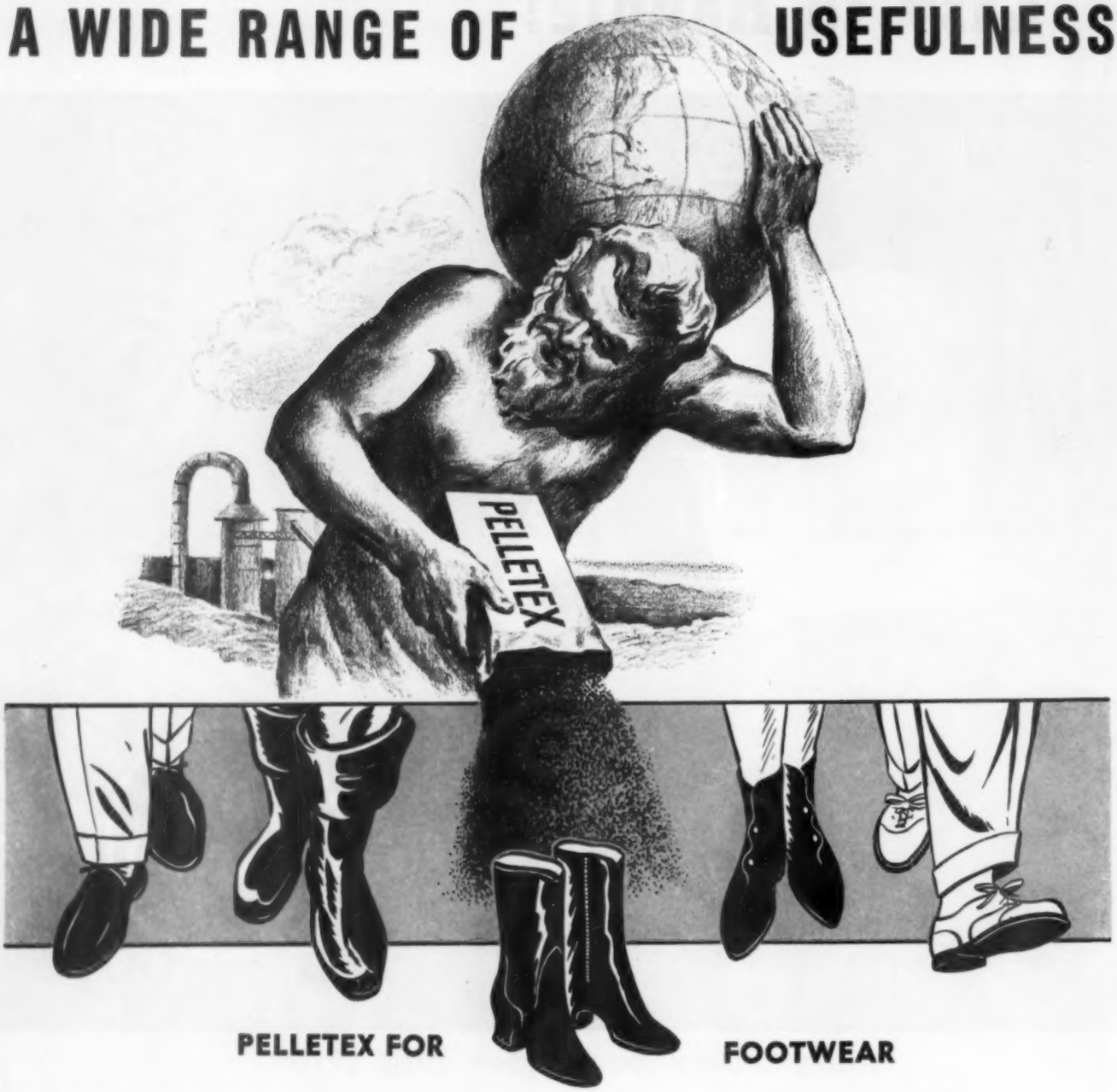
Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SUN

SUNOCO

INDUSTRIAL PRODUCTS

A WIDE RANGE OF USEFULNESS



PELLETEX FOR FOOTWEAR

For longer wear and greater comfort in waterproof footwear PELLETEX S R F black in the compound has been found universally superior. Time tested for a decade it is the ideal black pigment for overshoes, boots, soles and heels.

Easy to process
Low permanent set
Age resistant
Freedom from cracking

Our Technical Staff at Your Service

MANUFACTURER
GENERAL ATLAS CARBON CO.
PELLETEX
PAMPA, TEXAS
GUYMON, OKLA.

DISTRIBUTOR
HERRON BROS. and MEYER
NEW YORK, N. Y.
AKRON, OHIO

RUBBER CHEMICALS DEPARTMENT

now a unit of

CALCO CHEMICAL DIVISION

AMERICAN CYANAMID COMPANY

Effective January 1, 1947, the Rubber Chemicals Department, American Cyanamid Company, will be a unit of Calco Chemical Division. Rubber chemicals will be sold through the same distributors as in the past.

Sales Representatives: Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. Herron & Meyer, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

Calco

Rubber Chemicals Department

CALCO CHEMICAL DIVISION

AMERICAN CYANAMID COMPANY

Bound Brook, New Jersey

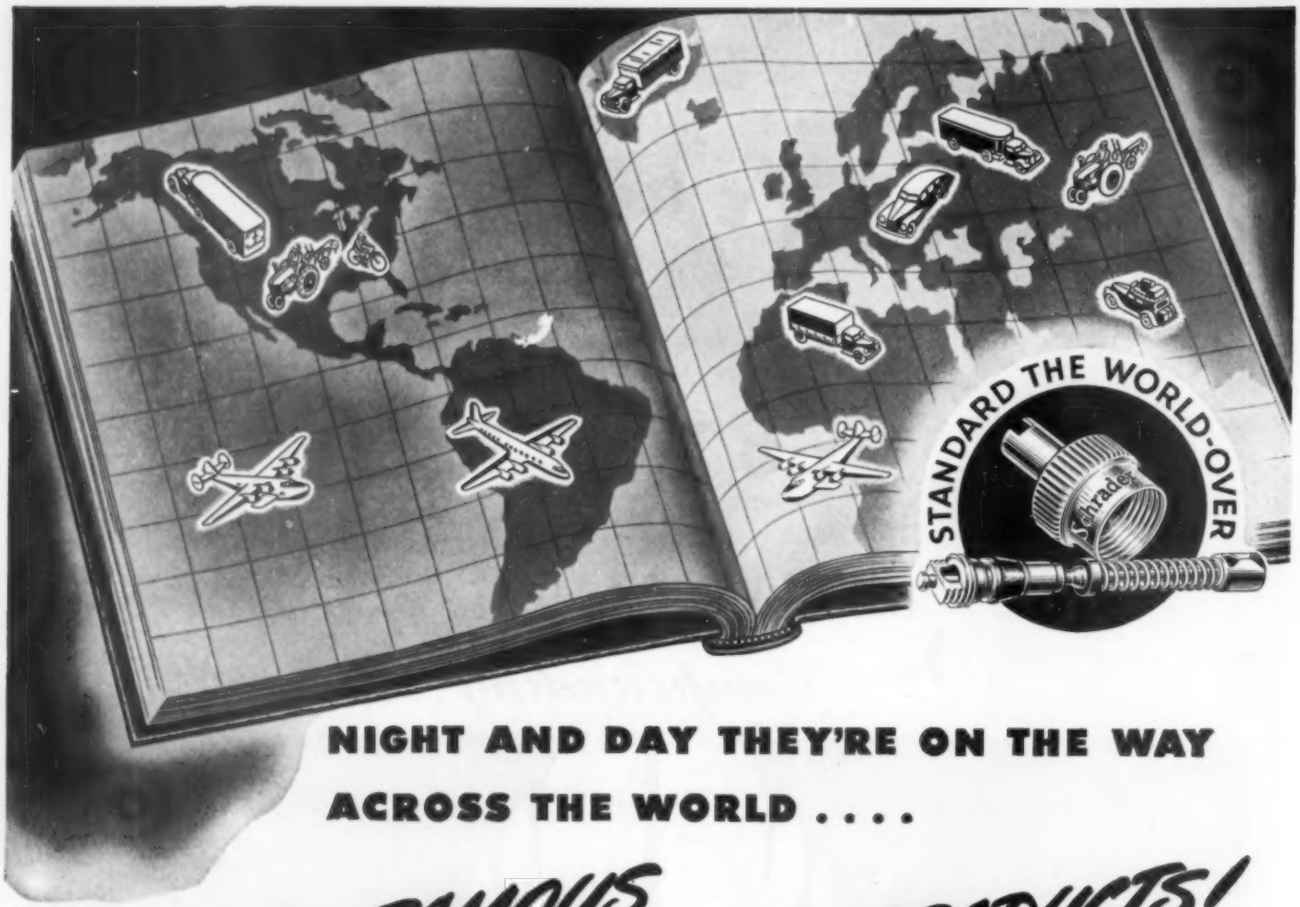
LATEX AND RESIN COMPOUNDS
We specialize in "ready-to-use" compounds, *custombuilt* to your requirements. Featuring natural and synthetic latex, and resins, we offer a complete service—from research to finished product. For any bonding, coating, dipping, or impregnating problem, it will pay you to call on our laboratory advisory service.
GENERAL LATEX & CHEMICAL CORP.
666 Main Street, Cambridge, Mass.
GENERAL LATEX & CHEMICALS (CANADA) LTD.
Verdun Industrial Buildings, Verdun, Montreal, Quebec
Sales Representatives:
525 Washington Highway, Snyder, N.Y.
304 West 42nd Street, New York City
First Central Tower Bldg., Akron, Ohio
2724 West Lawrence Ave., Chicago, Ill.

ACCELERATORS
PLASTICIZERS
ANTIOXIDANTS

A Complete Line of Approved Compounding Materials

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON OHIO, • LOS ANGELES, CALIF. • CHICAGO, ILL.



NIGHT AND DAY THEY'RE ON THE WAY ACROSS THE WORLD . . . .

WORLD FAMOUS SCHRADER PRODUCTS!

● 24 hours a day, 365 days a year, in every country in the world, Schrader Products are serving the transportation industry, the motoring and bicycling public, and the farmer.

The motor freight that rolls along the Alaskan Highway, the taxi that chugs up the Khyber Pass, the plane that soars over the Andes, and the tractor that pulls the plow across our own country's far-flung acreage all depend on Schrader precision-engineered valves and accessories for top tire performance and economical operation.

Scientifically-built Schrader Cores make tire valves absolutely air-tight under every operating condition . . . and neither the incessant pounding of a truck tire over rocky terrain nor the sudden impact of a plane's tire on the concrete runway can budge a Schrader Cap once it's put on finger-tight.

Similarly, the accuracy of Schrader Gauges, the efficiency of Schrader Vulcanizers, the durability of all other Schrader Tire Valve Tools and Equipment have won the respect and admiration of jobbers, dealers and users alike.

ONE SOURCE **Schrader** PRODUCTS CONTROL THE AIR **ONE RESPONSIBILITY**

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Inc.,* **BROOKLYN 17, N. Y.**

ORIGINATORS OF THE COMPARATIVE AIR LOSS SYSTEM FOR FLAT TIRE PREVENTION

American Anode latices and mixes

...the **MODERN** *way to coat and impregnate paper and textiles*

★What type of material do you need to solve your coating and impregnating problems? GEON, HYCAR, Saran, neoprene, GR-S, natural rubber? American Anode offers water dispersions of all these products, individually or in combinations for coating and impregnating paper and textiles the *modern* way.

And while these materials are helping you solve product problems, they may help solve production problems, too. That's because American Anode water dispersions are so safe and easy to use—no dangerously explosive solvents to be reckoned with—no cumbersome and costly solvent recovery systems.

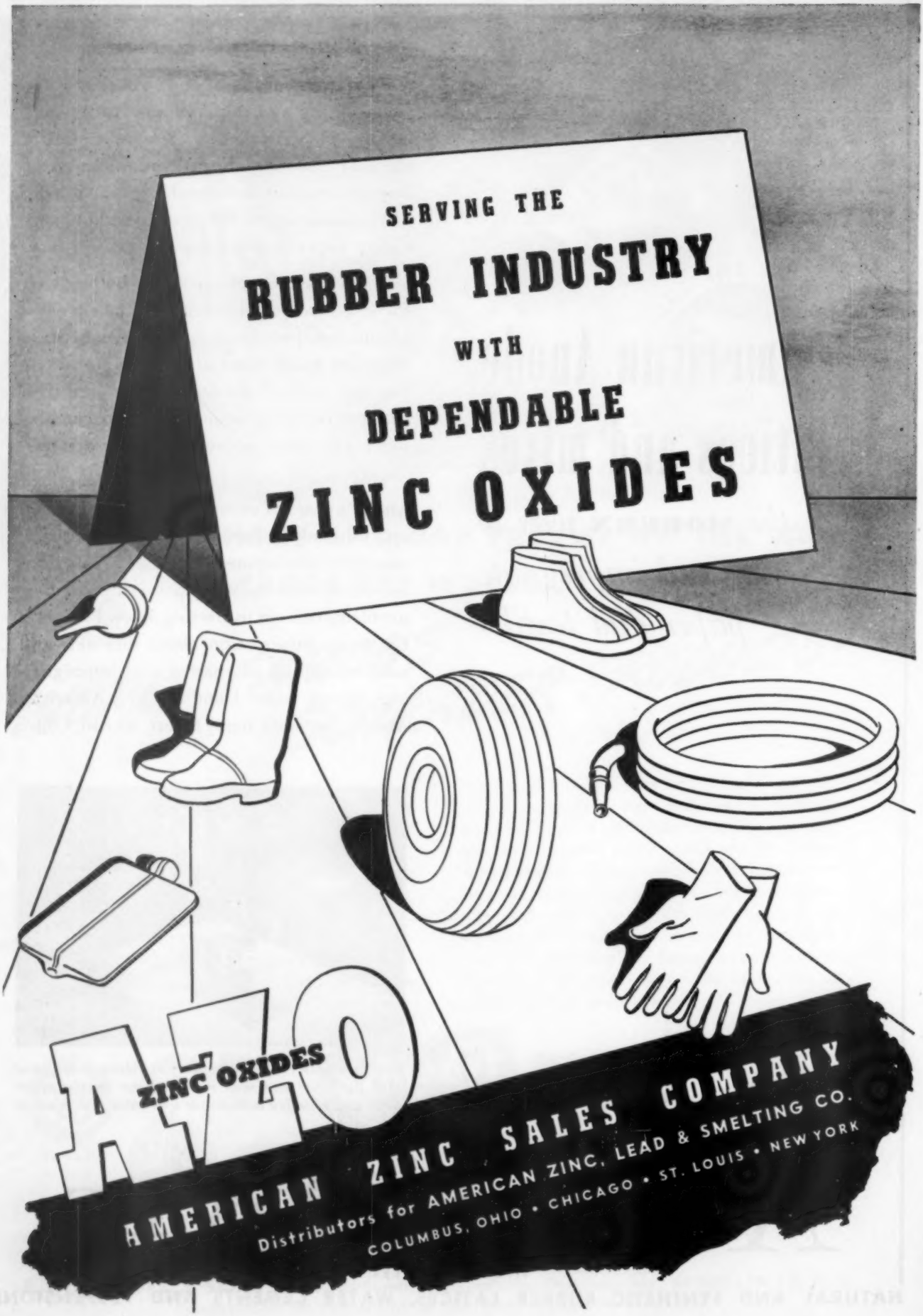
Why not take advantage of American Anode's years of experience . . . its constant up-to-the-minute research . . . its unusually complete development facilities . . . its honest desire to help you, in solving existing problems or even in starting a new business? For more information about this new and *modern* method of coating and impregnating, please write Dept. AG-1, American Anode, Inc., 60 Cherry Street, Akron, Ohio.

The American Anode laboratory in Akron is equipped with the latest and most modern paper testing equipment, and is staffed with people who know how to use it.

AMERICAN ANODE

INCORPORATED

NATURAL AND SYNTHETIC RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS


SERVING THE
RUBBER INDUSTRY
WITH
DEPENDABLE
ZINC OXIDES
AZO
ZINC OXIDES
AMERICAN ZINC SALES COMPANY
Distributors for AMERICAN ZINC, LEAD & SMELTING CO.
COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

Announcing...

monoplex

a new name for Resinous Products' Monomeric Plasticizers

To make them easier for you to remember, The Resinous Products & Chemical Company announces the redesignation of their monomeric plasticizers. The following is a list of the complete line, new and old names:

MONOPLEX DBS	**(Dibutyl Sebacate)**
MONOPLEX DOS	**(Dioctyl Sebacate)**
MONOPLEX DOS Distilled	**(Distilled Dioctyl Sebacate)**
MONOPLEX DCP	**(Dicapryl Phthalate)**
MONOPLEX 5	**(Dibenzyl Sebacate)**
MONOPLEX 7 Distilled	**(Distilled Dibutoxy Ethyl Sebacate)**

Remember the new name, MONOPLEX, for your plasticizing needs. The products remain unchanged . . . to provide you with the same uniformity, quality and dependability.

THE RUBBER CHEMICALS DEPARTMENT

Represented by Cia. Rohm y Haas, S. R. L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

From Tires for Motor Cars to Grips for Handle Bars

Dutch Boy: "It's true of almost every product . . . if it's made with rubber . . . *it's better made with Red Lead.*"

Plant Chemist: "Just why are you so sure?"

Dutch Boy: "First, experiments showed, then experience *proved,* that compounding rubber with #2 RM Red Lead gives the advantages listed on the right."

Plant Chemist: "But don't those advantages depend on what I make?"

Dutch Boy: "Yes, they do. You get all seven if you make tires; but *most* of them apply with other fields, too."

Plant Chemist: "But don't they depend on the base I use?"

Dutch Boy: "They apply whether you work with GR-S, GR-S-10, GR-M, GR-A or GR-I. Just let us know your specific application, and our technical staff will gladly supply literature and any other information you need. Drop a line to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, New York."

CHOOSE YOUR OWN Rx REASONS FOR COMPOUNDING RUBBER WITH #2 RM RED LEAD

1. *Improved Heat Stability—Retention of Elasticity*
2. *Lower Heat Build-up—Cooler Running*
3. *Economical*
4. *Faster Curing Rate*
5. *Extended Curing Range*
6. *Excellent General Physical Properties*
7. *Safe Processing*

NATIONAL LEAD COMPANY—New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, West Virginia, (Evans Lead Division).

If it's made with Rx RUBBER ... it's better made with Rx RED LEAD

WITCO LEAD OLEATE

. . . FOR SMOOTH TUBING
. . . FOR REDUCTION OF HEAT BUILD-UP

Where smooth tubing or reduction of heat build-up are specially required, Witco Lead Oleate produces marked improvement in the behavior of GR-S and other rubbers. In addition, lead oleate reduces thiuram-type stock's tendency to scorch.

Witco Lead Oleate is well suited for use in natural and synthetic rubber compounds—for example, in wire coverings, where rapid vulcanization and smooth tubing are essential. In general the rubber industry has found that in many dark-colored stocks, Witco Lead Oleate improves scorch-resistance and decreases heat build-up.

Manufactured under rigid laboratory and pilot plant control, Witco Lead Oleate offers the maximum in uniformity and high-quality. Please request Technical Service Report #R-2.

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DOW CORNING

SILICONES

SILASTIC*
RESINS
VARNISHES
FLUIDS
GREASES

withstand heat
resist oxidation
exclude moisture

SILASTIC-coated conveyor belts

withstand 450° F. in Birdseye dehydrater

PHOTO, COURTESY PROCESSES, INC.

Silastic coating endures an average air temperature of 450° F. and heat radiated from coils containing Dowtherm at 650° F.

In this machine invented by Clarence Birdseye for rapidly dehydrating foods without excessive surface hardening, heat applied by conduction, convection and radiation removes about 40% of the moisture content in the first six minutes. Uniformity of processing depends upon free movement of food along a succession of conveyor belts. That's where Silastic enters the picture. Belts of stainless steel wire cloth coated with Silastic have a smooth, odorless, tasteless, flexible and heat-resistant surface to which food particles do not readily adhere. This application is typical of the increasing industrial market for more heat-resistant materials. If you need rubber-like materials for a service too severe for organic rubbers, try Silastic. Ask for leaflet No. V 2-2.

*TRADE MARK, DOW CORNING CORPORATION

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Los Angeles Office: 634 S. Spring Street
In Canada: Fiberglas Canada, Ltd., Toronto
Cleveland Office: Terminal Tower
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Plasticizer and Extender for GR—S

Chemically and physically Controlled

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Fact 1. Since V-J day, hundreds of industrial and commercial concerns have located factories, warehouses and distribution facilities on the Union Pacific right-of-way in the western states served by the railroad.

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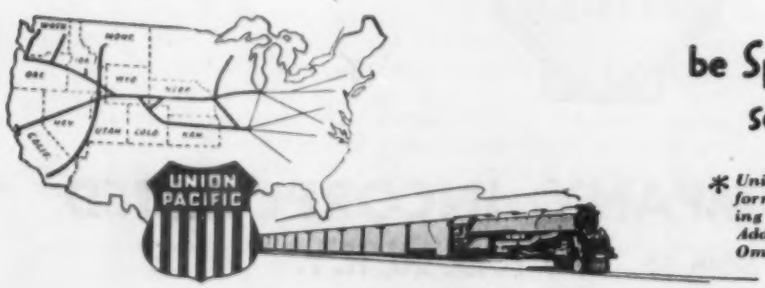
Fact 4. Over its Strategic Middle Route, uniting the East with the West Coast, Union Pacific provides unexcelled rail transportation.



be Specific – say "Union Pacific"

* *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

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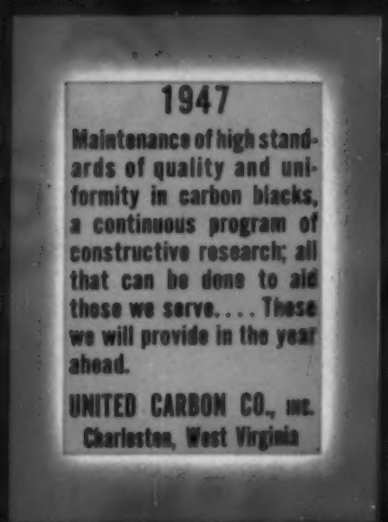
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Maintenance of high standards of quality and uniformity in carbon blacks, a continuous program of constructive research; all that can be done to aid those we serve.... These we will provide in the year ahead.
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The following Sharples products are sold to the Rubber Industry exclusively by R. T. Vanderbilt Co., 230 Park Avenue, New York 17, N.Y., to whom all inquiries concerning their use in rubber should be addressed.

ETHYL TUADS*
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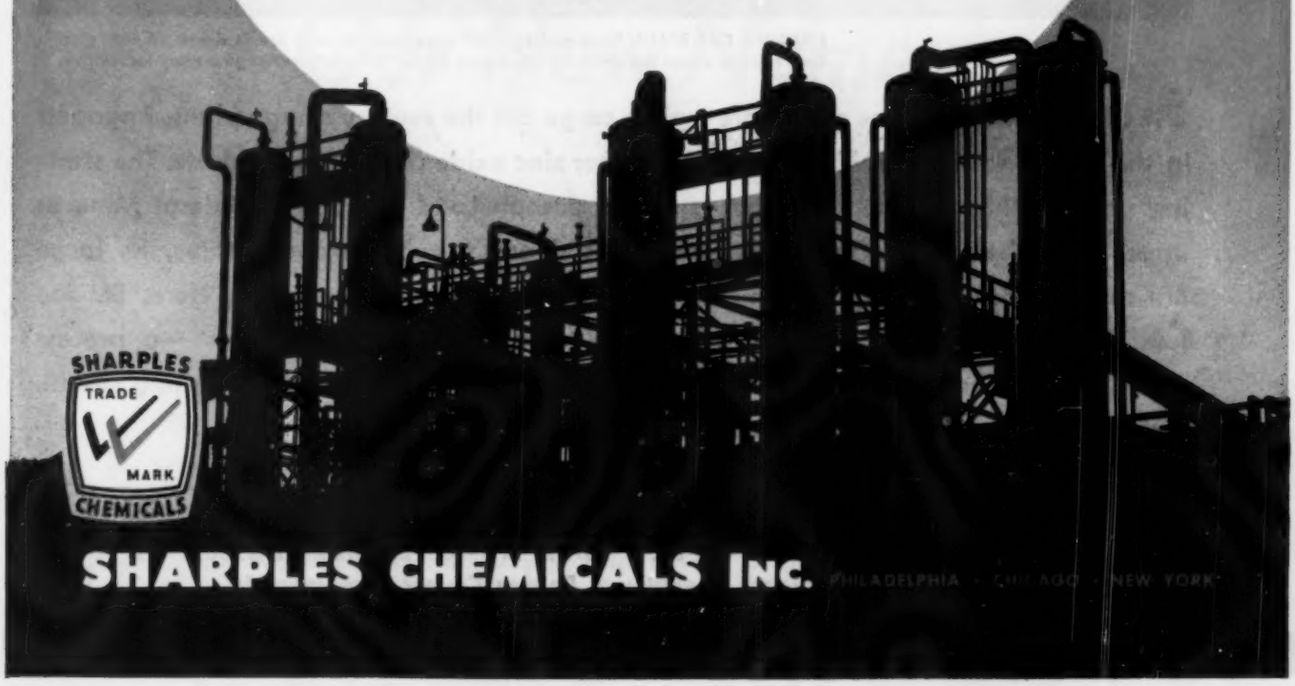

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SPECIAL TRAIN for consumers

LOADING ORE TRAIN: From underground ore chutes the zinc ore is drawn off into cars. Each train of about ten 3-ton cars is drawn by a 7-ton electric storage battery locomotive.

THE ultimate destinations of this ore train's cargo are the country's huge plants engaged in the manufacture of rubber, paint and other zinc oxide containing products. The starting point of this underground train is the St. Joseph Lead Company's Balmat Mine in upper New York State. One of the great zinc deposits in the United States, its large ore reserves are available for this company's Josephtown, Pa. smelter. Here, St. Joe lead-free Zinc Oxides are produced by a patented Electro-Thermic process—a process which makes it possible to produce pigments to a wider range of highly exacting specifications than could ordinarily be achieved.

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Plant & Laboratory: Josephtown, Beaver County, Pennsylvania

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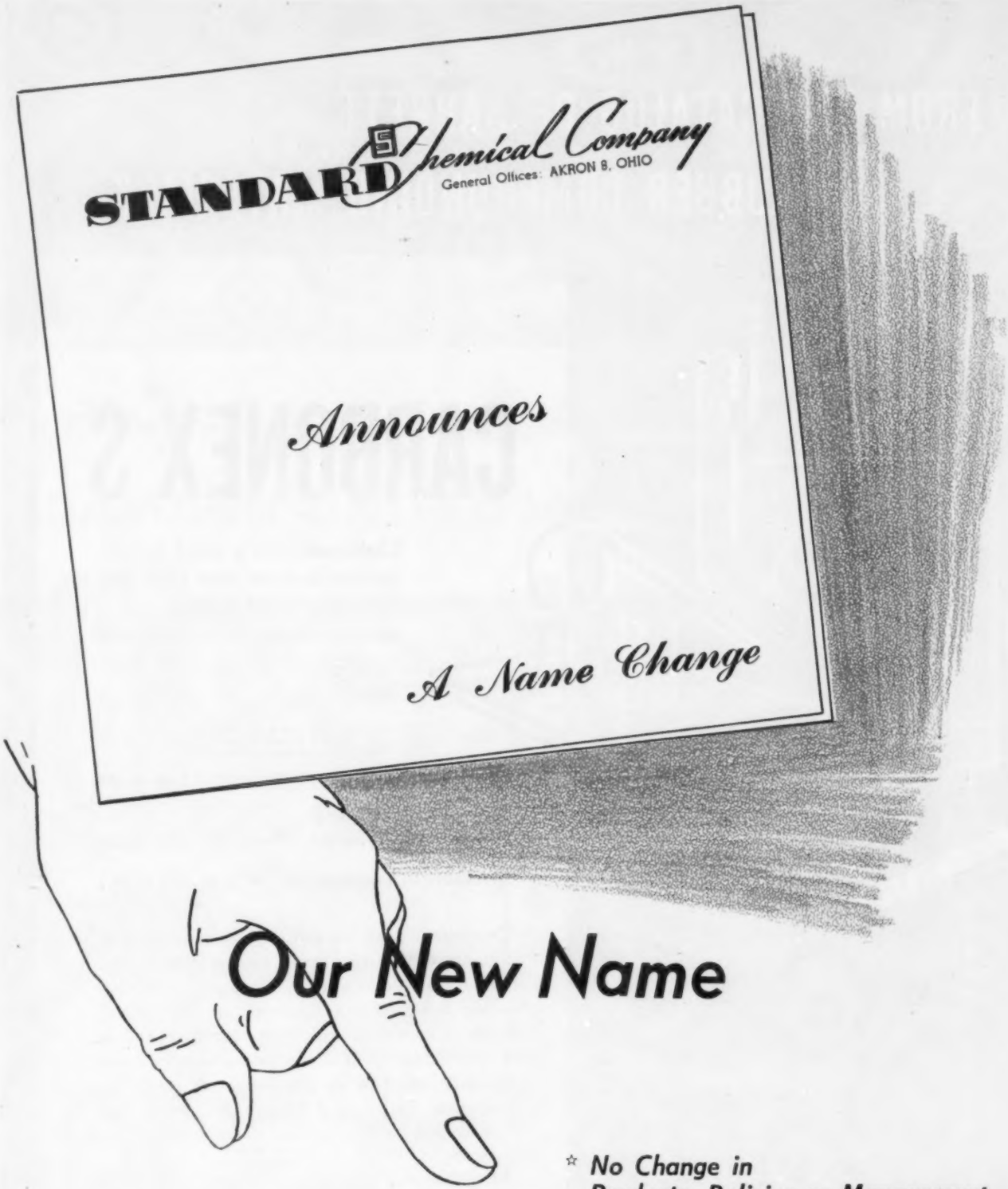

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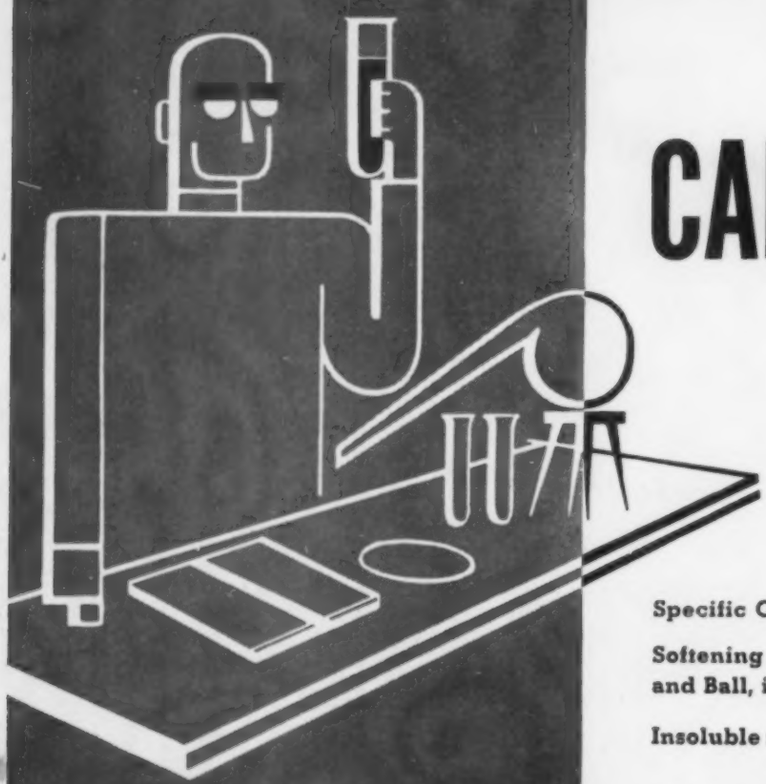
RUBBER COMPOUNDING MATERIALS...



CARBONEX* S

Carbonex S is a solid hydrocarbon derived from Coal Tar, and modified with a small amount of fatty acid. It is produced and shipped in flake form.

SPECIFICATIONS

Specific Gravity	@ 25C/25C	1.28 to 1.38
Softening Point, Ring and Ball, in Glycerine	Deg. Fahr.	210 to 225
Insoluble in Benzene	% by Weight	40.0 to 44.0

Carbonex S may be classified as a reinforcing softener containing a small amount of fatty acid which is available as such in compounding. Carbonex S serves as a plasticizer in the uncured stock at normal processing temperatures and as a reinforcing agent in the vulcanizate. It is particularly effective in the design of stocks for extrusion. Carbonex S also confers good flow and smooth finish in molded compounds.

Available in: Cotton bags containing 100 lbs. of material, up to carloads.

*Reg. U.S. Pat. Off.

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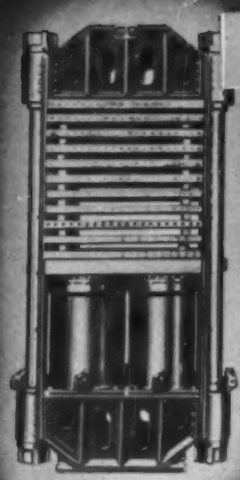
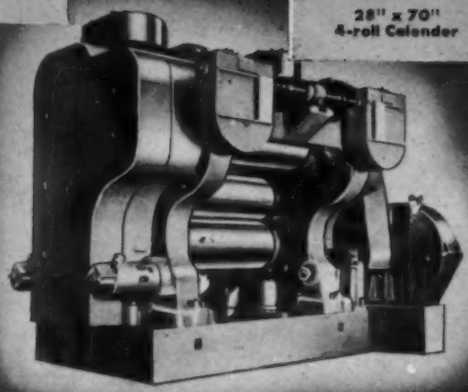
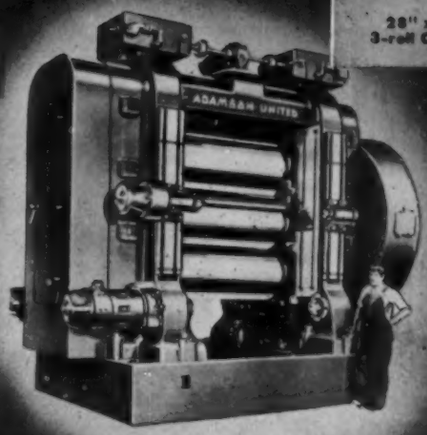


36" x 36" Platen Press



28" x 70" 4-roll Calender



28" x 70" 3-roll Calender

For Every Rubber Processing Purpose

ADAMSON UNITED EQUIPMENT

Mat Trimming Press

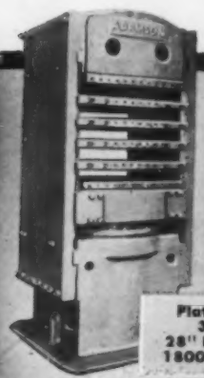
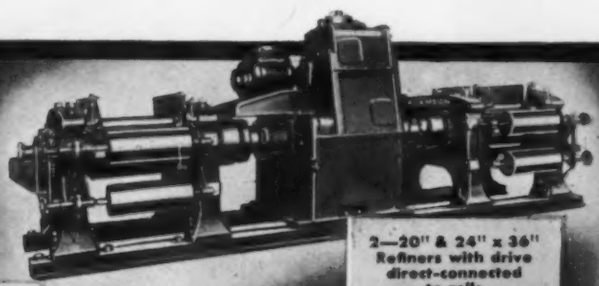
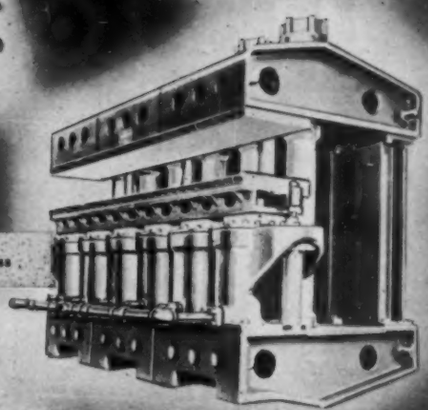


Plate Side Press 36" x 36" 28" Diameter Ram 1800 Lb. Hydraulic



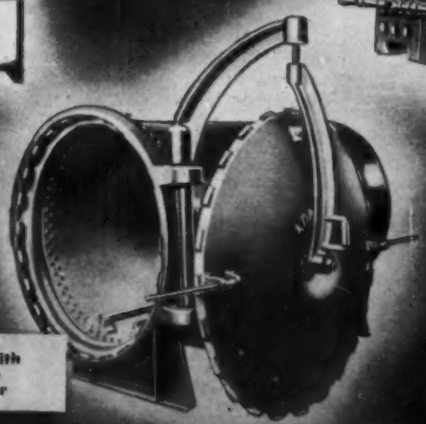
2—20" & 24" x 36" Refiners with drive direct-connected to rolls



Open side Press

Hydraulic operated Lift Tables

Fabric Festoon Storage Compensator



Vulcanizer with Davit-type hinged door

Building machinery for conventional or special rubber processing requirements has been our business for half a century.

This wealth of experience, fortified by consistent research and a knowledge of the industry's needs, have enabled us to pioneer many "firsts" in rubber manufacture.

If you contemplate the purchase of additional equipment to meet today's unusual demands, or if you are faced with the problem of creating new processes for unusual product requirements, consult us.

The experience and abilities of our engineers are at your service.

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- Calenders
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- Vulcanizers
- Autoclaves
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- Multi-Platen Presses
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- Belt Curing Presses
- Compression Molding Presses
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• Why worry over the weatherman's predictions for January if your feet are protected by warm, waterproof, light weight, good fitting rubber footwear.

Reclaimed rubber in footwear stocks smooths production and gives uniform high quality to the product.

Pequanoc **IMPERIAL** for uppers and foxing.

Pequanoc **AURORA** and **CALUMET** for black soles and heels.

Pequanoc **FALCON** and **MUSTANG** for tans and colors.

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LOW TEMPERATURE FLEXIBILITY
HIGH EXTRUSION RATE
REDUCED PLASTICIZER BLEEDING
FLEXIBILITY
NON-VULCANIZED PLASTIC COMPOSITION
COMPOSITION: Parts by weight
Vinyl Chloride polymer (stabilized) 100.0 100.0 100.0
Perbunan 35 50.0
Perbunan 26 50.0
Dioctyl phthalate 50.0 50.0 50.0
Physical Properties
Tensile Strength, psi 2900 1750 1150
Elongation at Break, % 270 380 340
Shore Hardness (Instantaneous) 80 65 65
Specific Gravity 1.27 1.18 1.16
Processing Characteristics
Extrusion rate: inches per minute 34 60 61
Appearance Smooth Very Smooth
Flexibility at Low Temperatures
Impact brittleness test: Broke at —20 F —50 F —60 F

The data illustrate how Perbunan 26 or 35, blended with a vinyl chloride polymer, provides *increased flexibility, great impact strength, low temperature flexibility, high extrusion rate* and *reduced bleeding of the plasticizer.* Perbunan—remarkable by itself in many automotive and aircraft parts—now greatly improves non-vulcanized plastic compositions. *Specify Perbunan for your rubber and plastic parts!*

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STANMOCO
hydraulic toggle presses

EQUIPPED WITH KNOCKOUTS OFFER BIG LABOR SAVINGS

CLOSED

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Specifications

Platens	34"x 34"
Maximum Opening	14½"
Pressure	200 Tons

Operation: Manual or automatic through use of cycle timers.

Press designed for use with 750 pounds hydraulic oil pressure.

Press can be furnished with or without hydraulic pumping unit.

Special knockouts can be furnished to meet individual requirements.

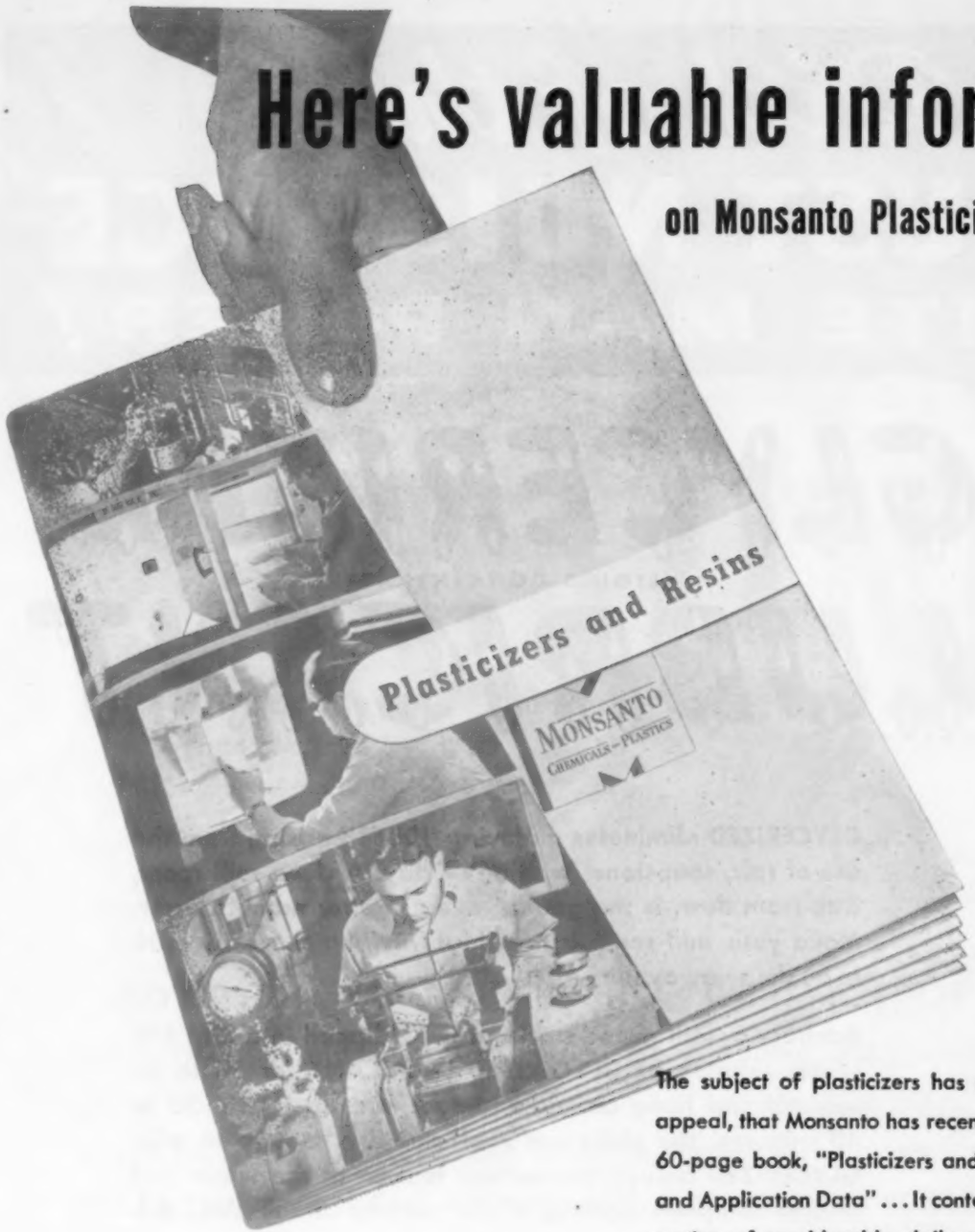
Presses can be furnished complete with molds and knockouts for any special molding job.

Write for complete details

The Akron Standard Mold Co.
Akron — "The Established Measure of Value" — Ohio

Here's valuable information

on Monsanto Plasticizers and Resins



The subject of plasticizers has such wide and general appeal, that Monsanto has recently revised and issued a 60-page book, "Plasticizers and Resins — Specifications and Application Data"... It contains much detailed information of considerable daily value — suggested uses, specifications, descriptions, tables, graphs, and various data on flash points, viscosities, pour points, solubilities ...A copy will be sent promptly on request. Contact the nearest Monsanto District Office, or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Cincinnati, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

Some Suggested Uses for Monsanto Plasticizers

Alkyd Resins • Benzyl Cellulose • Cellulose Acetate • Cellulose Acetobutyrate • Cellulose Acetopropionate • Chlorinated Rubber • Ethyl Cellulose Natural Resins • Neoprene • Nitrocellulose Phenolic Resins • Polystyrene • Polyvinyl Acetate Polyvinyl Butyral • Polyvinyl Chloride • Polyvinyl Formal • Protein Compounds (Soybean or Corn Protein, Casein, Glue) • Santolite Resins • Urea Formaldehyde Resins.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

Get Rid of the "DUST NUISANCE"—
INVITE MAN POWER!

GLYCERIZED
(LIQUID CONCENTRATE)
LUBRICANT

. . . . **GLYCERIZED eliminates annoying "DUST" arising from the use of talc, soapstone, whiting or clay. A clean mill room, free from dust, is the goal of every rubber manufacturer. *Make your mill room a healthful, inviting place to work in by doing away with all 'dust'.***

. . . . **Banbury or mill mixed stocks may be dipped in a 2 to 5% water solution of GLYCERIZED LUBRICANT for 10 to 30 seconds and hung on racks to cool and dry. After 30 to 40 minutes, the slabs are cool and dry enough to pile. GLYCERIZED reduces the surface tension of the water and insures complete wetting of the surface of the slab. Adhesion is nullified!**

. . . . **Use GLYCERIZED in your extruding operations—as a mold lubricant—for coating mandrels and cores—belt drums—air bags—washing and finishing inner tubes—processing of insulated wire and cable—all with gratifying results.**

. . . . **GLYCERIZED *is adapted to all types of synthetic rubbers as well as to natural rubber, reclaim or mixtures!***

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AQUAZINC is particularly convenient for surface application of Zinc Stearate. When diluted with 8 to 20 parts of water, it can be applied by spray or bath.

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INDONEX rubber plasticizers

633½ – 634½ – 635½ – 638½ – 639½

NON-VOLATILE COMPATIBLE VERSATILE

GR-S CAMELBACK

FORMULA GR-S 100—EPC Black 50—Zinc oxide 5—INDONEX 639½ 10—Sulfur 2—Zenite B 1.75—Stearic acid 1—Thermoflex A 1.

PROPERTIES (50′ cure at 292°F.). Tensile 2245 (2250)*—Modulus 200% 290 (965)*—Elongation 835 (440)*—Hardness 50 (64)*—Tear 350 (340)*

*After aging 70 hours at 212°F.

PERBUNAN HARD RUBBER

FORMULA—Perbunan "26" 100—Sulfur 42—Extra light MgO 5—Calcene 50—INDONEX 639½ 10.

PROPERTIES—Tensile and Shore D Hardness (30′ at 325°F) 5200 and 75—(60′) 6750 and 85—(90′) 6800 and 86.

HIGH LOADING OF EPC BLACK IN NATURAL RUBBER

FORMULA—Smoked Sheets 100—EPC Black 100—INDONEX 639½ 35—ZnO 5—Stearic acid 1—Sulfur 3—Benzothiazyl disulfide 1—BLE Powder 1.

PROPERTIES (Avg. of 6 cures at 316°F.). Tensile 1912 (1182)*—Modulus 200% 417 (1002)*—Elongation 600 (250)*—Hardness 56 (74)*—Tear 315 (239).*

*After aging 70 hours at 212°F.

Send for Bulletins 13 and 13A

These bulletins describe typical tire, inner tube, and mechanical goods applications (with GR-S, natural rubber, Neoprene, Chemigum, Perbunan) including examples of unusual high-loaded low-cost GR-S and Neoprene compounds.

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MAGNESIUM OXIDE

EXTRA LIGHT

The Original Neoprene Type.
A supreme quality product for the rubber trade. Extremely fine state of division. Improves storage stability and resistance to scorching. A curing agent unexcelled for increased modulus, greater resilience, reduced heat build-up, lower compression set and retention of tensile strength during heat service.

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A high quality product of greater density than "Extra Light," but high in MgO and low in impurities. An excellent value for many uses.

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A good value. Very active. High Magnesia content, low in impurities. Medium density.

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All types can be furnished. Specially ground to meet the exacting Code Pigment Specifications of the Rubber Trade. Unground types for chemical uses.

PACKAGES—Specially designed to protect contents from moisture and air. Corrugated cartons with special asphalt laminated moisture-proof liner, and inner paper liner. Five-ply multi-wall bag, including special asphalt laminated moisture-proof liner.

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Specialist in Magnesia

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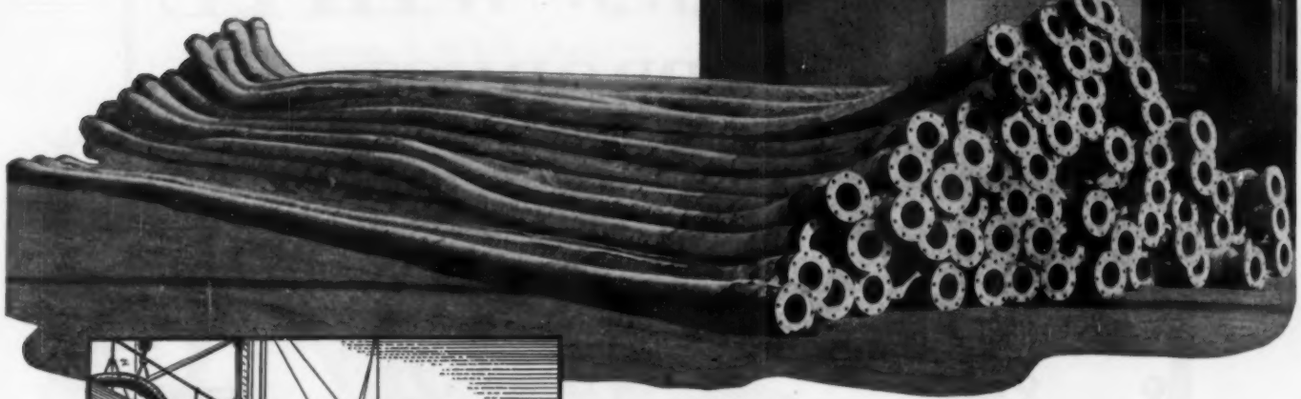

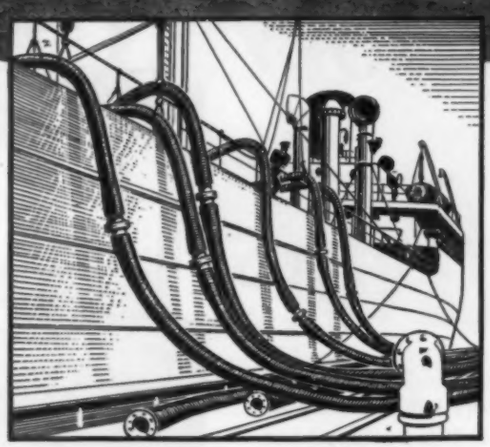

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Technical Bulletin No. 29 — on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

Rebound-Temperature Measurements

Goodyear-Healey Pendulum

GR-S—X-272, GR-S and GR-S-10

Time of Cure at 45 Lbs.	GR-S—X-272			GR-S			GR-S-10		
	Goodyear-Healy Pendulum			Goodyear-Healy Pendulum			Goodyear-Healy Pendulum		
	Block Temp. °C.	Indentation in mm.	Per Cent Rebound	Block Temp. °C.	Indentation in mm.	Per Cent Rebound	Block Temp. °C.	Indentation in mm.	Per Cent Rebound
90	0	6.01	42.3	0	6.73	46.7	0	6.01	35.6
	13.3	6.41	50.3	14.0	7.20	54.8	14.1	7.18	49.2
	18.9	6.71	53.9	21.1	7.47	58.0	19.6	7.18	52.8
	26.3	6.90	57.1	53.3	7.92	67.0	26.3	7.43	56.0
	51.1	7.30	63.8	87.7	8.21	71.6	57.5	8.02	62.8
	90.6	7.64	70.3	114.4	8.34	74.3	100.7	8.45	71.6
	114.6	7.77	74.0	134.3	8.42	75.7	125.0	8.53	74.6
	137.2	7.85	75.7	149.9	8.45	75.7	148.3	8.64	77.7
	160.3	7.92	78.1	174.5	8.57	75.7	168.3	8.78	79.8
	177.6	8.06	79.5	192.6	8.89	75.3	185.4	8.95	79.8
	194.0	8.30	80.2				192.2	9.14	79.8

(Refer to Technical Bulletins Nos. 20, 24 and 28)

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The RUBBER AGE

VOLUME 60

NUMBER 4

One of the World's Outstanding Rubber Journals

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CONTENTS FOR JANUARY, 1947

Backrinding of Molded Products—*By Embert L. Stangor* 439

Report on Rubber Cultivation in British East Africa 442

Recent Advances in the Physics and Chemistry of Rubber: 3—Ultraviolet Absorption Spectroscopy in Rubber Research—*By H. P. Kaye* 443

Plastic Bonds Resistant to Temperature Changes 446

Use of High Temperature Fluid in Rubber Manufacturing Processes—*By Paul L. Geiringer* 447

Use of the Amberols in Synthetic Rubber Stocks 449

Use of the Multipress in Cutting Test Specimens—*By Ellsworth E. McSweeney and La Verne E. Cheyney* 450

Medical Protection in Solvent Operations—*By Lillian Gordon* 451

Recent German Developments in the Manufacture of Vinyl Plastics 452

Division of High-Polymer Physics, A.P.S., Schedules a Three-Day Technical Session 453

REGULAR DEPARTMENTS

New Equipment	479	Coming Events	459
Book Reviews	484	Obituaries	476
Editorial	456	Los Angeles News	...
Financial News	472	Rubber, Cotton Markets	488
Names in the News	464	Current Statistics	490
Canadian News	474	Classified Ads	498

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RUBBER AGE

Vol. 60, No. 4 JANUARY, 1947

Backrinding of Molded Products

By EMBERT L. STANGOR

Rubber Laboratory, E. I. du Pont de Nemours & Co., Inc., Akron, Ohio

BACKRINDING, sometimes called flashback or suckback, is the term used to indicate the torn or gouged condition which occasionally occurs at or near the mold parting line on a vulcanized article. This serious problem usually does not present itself on molding thin sheets. However, it causes considerable difficulty in the molding of cylindrical slugs, rectangular blocks, cones and many other fundamental shapes.

Backrinding is caused by the sudden release of internal pressure which results from the thermal expansion of the compound during its rise to curing temperature. With the release of external pressure on the mold, the compound actually tears itself apart in an effort to expand through the slight opening at the mold register line.

Backrinding in a molded slug is affected by: (1) Volume of uncured compound used; (2) Volume of elastomer in compound; (3) Type of filler used; (4) Curing temperature and pressure; (5) Temperature differential between stock and mold; (6) Mold design.

Several different mold designs were evaluated in our study of methods of controlling backrinding. All, however, were based on a right cylinder 4 inches in diameter.

The first mold used (Fig. 1) was rather complicated and was designed to provide conditions conducive to air trapping, tearing on removal from mold and backrinding. This mold was used in studying the effect of varying the amount of uncured compound in the mold, and variations in methods of operating the press during vulcanization. Since backrinding is our only consideration, no attempt is made to discuss the air trapping and tearing which occurred during molding tests.

In determining the amount of compound to properly fill the mold cavity, uniform conditions of temperature and pressure were maintained by using one press. Quantities both greater and smaller than this amount

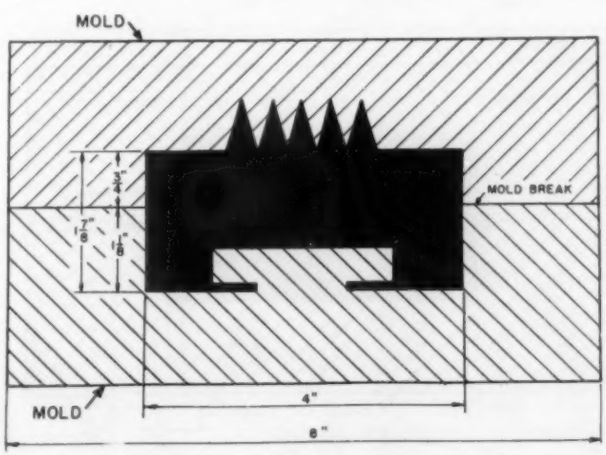


FIG. 1—Original mold.

Note: This article is based on a paper delivered by the author before the Akron Rubber Group, in Akron, Ohio, on November 22, 1946.

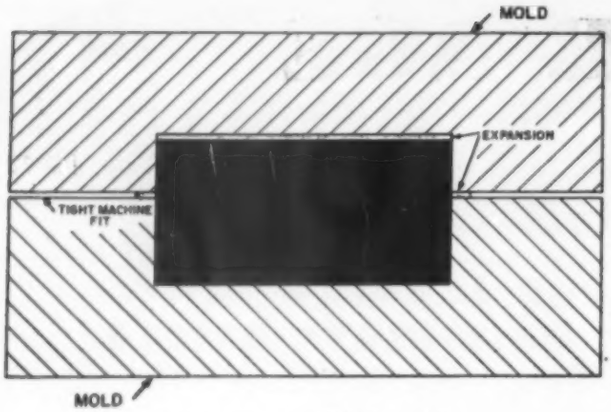


FIG. 2—Simplified mold.

were tried. Backrinding was encountered in all cases except where the quantity of compound was not sufficient to fill the mold.

Maintaining the same volume of compound in the mold in all cases, and using the following basic formula, stocks were tested containing 97, 75, 50 and 25% rubber by volume:

TEST COMPOSITION

Natural Rubber	100
Zinc Oxide	5
Accelerator	1
Sulfur	3

Percent rubber by volume, 97.0
Volumes of filler/100 volumes of rubber, 2.44

The stocks were loaded with whiting as an inert filler. Backrinding was observed only in the gum stock. Again using whiting as a filler, stocks were prepared containing 80 and 85% rubber by volume and it was found that the 85% stock developed slight backrinding whereas the 80% stock did not. It was accordingly concluded that 80% rubber by volume represented the approximate limit. However, when carbon black was used as the diluting agent, stocks containing as little as 50% rubber by volume showed very bad backrinding. This study indicates that some relief can be obtained by choosing a filler which has a low coefficient of thermal expansion.

The effect of rate of cure was then investigated. It was found that the gum stock produced backrinding regardless of whether fast or slow acceleration was used.

The effect of varying the time of mill breakdown was also studied, using breakdown periods of 0, 15 and 30 minutes on a cold tight mill. The softness of the uncured stock made no difference in the degree of backrinding.

Different methods of releasing the hydraulic pressure on the press were tried without any control over the degree of backrinding.

Starting with a cold mold made no improvement. However, backrinding was completely eliminated by cooling the mold under full pressure before removing the cured part. On cooling in the mold, the part shrank to the nominal mold dimensions, and thus there was no internal pressure to cause backrinding.

The internal pressure developed by the stock in a mold is equal to or less than the pressure developed by the hydraulic ram of the press. If the pressure in the mold exceeds the ram pressure, the mold opens and some of the stock is forced out of the mold cavity thus equalizing the pressures. In the course of this study, it was found that the gum stock, when cured at 287°F. in this mold, developed an internal pressure of approximately 10,000 p.s.i. This was determined by varying the ram pressure and noting how much pressure was required to prevent permanent mold opening during the cure. Identical mold loading conditions were maintained.

Temperature differentials between the stock and the mold are very important. High differentials are more conducive to backrinding because of greater thermal expansion of the compound. Under ordinary conditions of molding, a differential of approximately 200°F. will be found. The stock, at room temperature, might be 100°F. while the mold will be near 300°F. If injection molding is being used, the differential will be much smaller. The stock will enter the mold at a temperature around 275°F. while the mold will be in the neighborhood of 350°F. so the differential will be only 75°F. Injection molding decreases the tendency to backrind but does not always eliminate it. A method which should eliminate backrinding would be to pre-heat the compound to curing temperature before loading the mold. This could be accomplished by electronic heating. In this case there is no temperature differential, so there can be no thermal expansion. Therefore, no backrinding will occur.

Since it is obvious that it is impractical to control backrinding by cooling the mold in the press, and it is

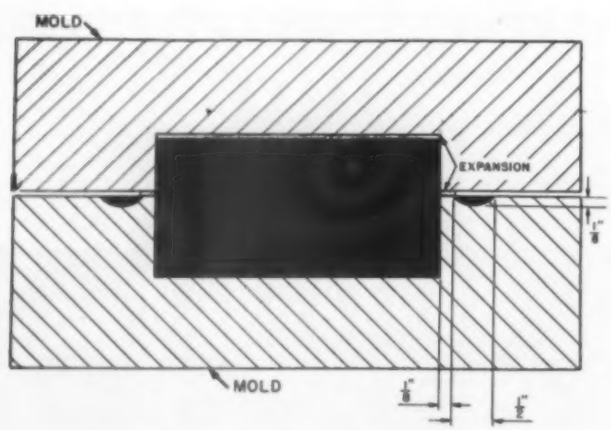


FIG. 3—Mold with flow cavity added.

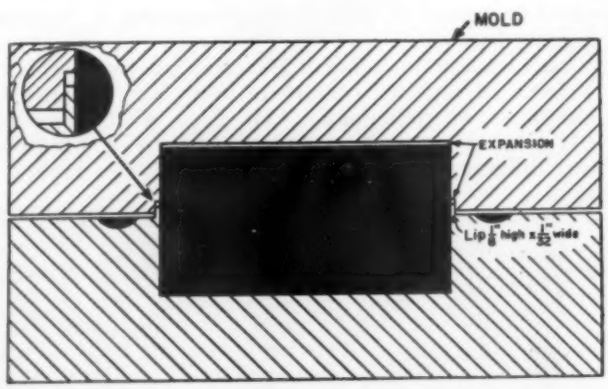


FIG. 4—"Lip" type mold.

only occasionally that the rubber by volume in a given compound can be altered for this purpose, consideration was given to changes of mold design.

The first mold used contained no flow cavity and the two surfaces at the parting line were machined to a tight fit (see Fig. 2). Although this mold was used in all of the test work described thus far, it is recognized that this type of mold with no overflow cavity is not representative of standard production molds.

The first modification in mold design was to provide a flow cavity ⅛ inch from the edge of the mold wall. This cavity was ⅛ inch deep on a ½ inch radius (see Fig. 3). No control over backrinding was achieved by the addition of an overflow cavity.

The next change was to provide a semi-entering or semi-plunger type closure at the parting line. It was assumed that if a positive seal could be provided to restrain the horizontal flow of the cured part until the pressure was dissipated through vertical opening of the mold, backrinding could be controlled. By using a 1/32 inch lip with a ⅛ inch vertical entering segment, it was thought that the stock flow would be limited to 1/32 of an inch and that under these conditions the travel would be so restricted as to prevent the stock from rupturing over the mold edge (see Fig. 4).

Using the gum rubber stock, a sample was cured and the hydraulic pressure released in the normal manner. At this instant, and before the mold was completely open, the cured slug blew out with sufficient force to flatten down a segment of the lip approximately 1/3 the circumference of the mold (Fig. 5). The cured sample displayed extremely deep backrinding over the segment where the lip was flattened down.

Inasmuch as a mild steel lip 1/32 inch thick could not be expected to withstand the pressure built up by the stock, it was hoped that ⅛ inch of vertical travel would be sufficient to relieve this pressure and prevent backrinding and damage to the mold lip. Since there was still sufficient pressure to flatten out the lip after ⅛ inch of travel, a higher lip or a smaller volume of stock for the same lip height was indicated. For reasons of expediency it was deemed advisable to reduce the volume of stock in the mold by means of inserts rather than machine new molds with higher lips.

In rebuilding the mold the fins which are shown were removed, and studies from this point were conducted on a simple cylinder 4 inches in diameter and

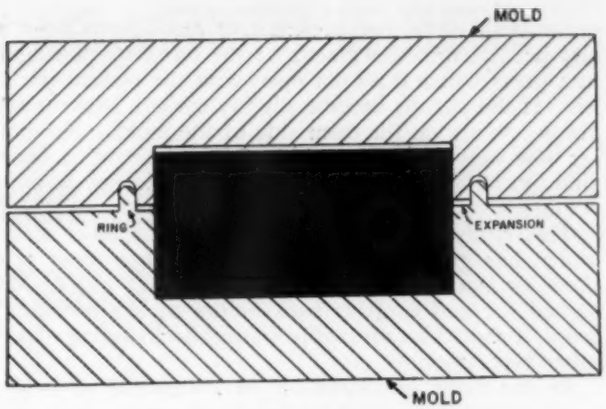


FIG. 6—"Ring" type mold.

1-⅞ inches high. The lip was replaced by inserting a 1/32 inch thick ring in the bottom cavity. By placing inserts in the mold cavity, the volume of compound required was gradually reduced by approximately 50 per cent, or from 23.6 cu. inches to 12.6 cu. inches. Using this volume of compound and a lip 1/32 inch thick by ⅛ inch high no backrinding was encountered.

Consideration was then given to the factor of safety which would be required to take care of the "bounce" which takes place on most presses when the hydraulic pressure is released. The thermal expansion of the cured rubber was determined at temperatures ranging from 80°F. to 302°F. It was found that the original 23.6 cu. inch volume had expanded to 25.6 cu. inches —an increase of 2 cu. inches or 8.5 percent. Applying this percentage volume increase to the 12.6 cu. inch part which did not backrind, it was found that the lip height required to just balance the volume increase of the smaller sample would be slightly over 5/64 inch. For the full mold about 5/32 inch would be needed. However, a lip height of ⅛ inch had to be provided for the small sample. Therefore, a safety factor of approximately 35% in lip height was required to take care of the "bounce." Thus, it would seem that for the original mold the lip height must be approximately ¼ inch in order to control backrinding.

The importance of parallel press platens in controlling backrinding cannot be over-emphasized. Mold-

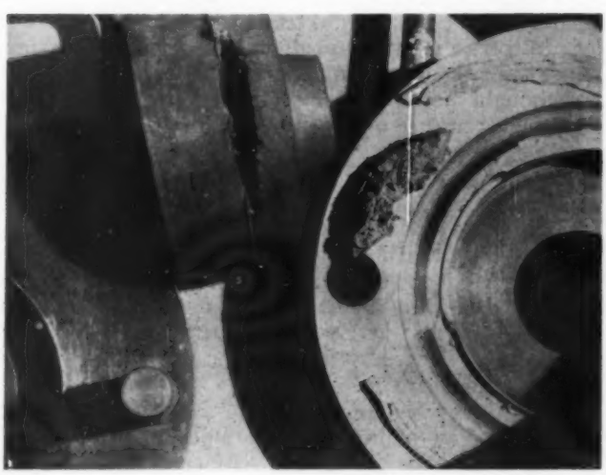


FIG. 5—Cured sample.

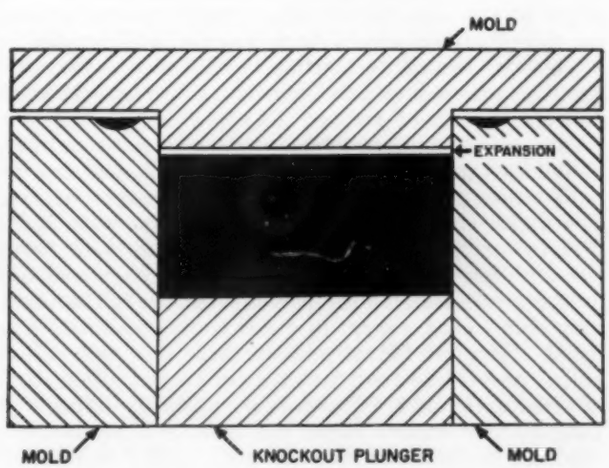


FIG. 7—"Semi-Entering" type mold.

ing studies show that backrinding can be produced at any predetermined segment of the mold by placing it in a press which does not open with the platens parallel. If the platens become slightly cocked, backrinding always occurs on the open side of the mold. No matter how well the mold is designed for control of backrinding, it may still occur if the press is not in good condition.

This study was made using a "gum" rubber stock, which has greater thermal expansion than most synthetic or loaded rubber stocks. Thus, if a mold is designed for and controls backrinding of a gum rubber stock, it should satisfactorily control backrinding of any other type stock.

If the only consideration in compounding stocks were the elimination of backrinding, compounds could be developed having sufficiently low thermal expansion at curing temperature to minimize this common factory trouble. However, compounds of all types and grades must be molded and thus the control of backrinding by compounding is not always possible.

Therefore, the manufacturer of molded goods can profitably give more consideration to mold design in its relation to a given compound at its curing temperature. Experiments demonstrate that the mold should be so designed that the internal pressure is released before any opening occurs to permit unrestricted distortion of the stock over the parting line. This may be accomplished with the use of "ring" type molds (Fig. 6) or plunger type molds (Fig. 7).

The control of backrinding is accomplished with the "ring" type mold in a manner similar to that of the semi-entering lip type mold previously discussed. Using the ring instead of a thin lip provides greater strength in a mold which is to be used for production.

The plunger type mold, although limited in its application, provides positive control over backrinding. All expansion on release of hydraulic pressure must be in a vertical direction, and there is no mold parting line over which the stock can tear itself.

To summarize, this study demonstrates that backrinding results from tearing of the stock over the edge of the mold at the parting line and is caused by the sudden expansion of the cured stock when the external pressure is released from the mold. This expansion is due to the pent-up energy which results from restrained thermal expansion when the composition is heated to curing temperature.

Several factors influence backrinding. Careful control of the volume of uncured stock entering a given mold cavity is important. In other words, overloading a mold can produce backrinding.

The elastomer content and the type of filler used have definite effects. Increasing the content of inert filler in the composition tends to decrease backrinding. Some fillers have lower thermal expansion than others, and are therefore preferred as loading. The softness of the uncured composition and its rate of cure have no bearing.

Curing at lower temperatures produces less thermal expansion, and hence is favorable to the control of backrinding. Cooling the mold under pressure completely eliminates it. Press pressure has no effect but must, of course, be high enough to keep the mold tightly closed throughout the cure.

Manufacturers of molded articles can solve most backrinding problems by bearing in mind that the mold should be designed to avoid localized concentration of pressure on the article when the mold is opened at the end of the cure.

The design of molds is best done by the rubber manufacturer who knows the requirements of rubber molds and can design them in a manner to produce fewer defective parts which in turn results in lower costs to the consumer.

Report on Rubber Cultivation in British East Africa

AN interesting report on agricultural activities in British East Africa covering the four-year period from 1942 to 1945 was recently issued by the East Africa Agricultural Research Institute, at Amani, through the British Colonial Office at London. Several pages of the report deal with rubber activities during the period, from which the following is abstracted:

Uganda Hevea production, established some time ago, was proceeding satisfactorily, as also was the small collection of wild rubber. A few Ceara estates in Kenya were facing problems similar to those on Tanganyika estates, including tapping, coagulation, and rehabilitation of old estates. Wide differences between Ceara and Hevea in regard to coagulation were noted. The former coagulates when diluted with water without addition of a coagulant, and anti-coagulants and preservatives suitable for Hevea latex are not satisfactory with Ceara, except in much larger quantities than usual. Saponin, borax, sodium carbonate, and sodium sulfite proved the most suitable for Ceara. Also, latex of *Funtumia* and *Clitandra orientalis* is difficult to coagulate. Formalin is not available in Uganda and a modified form of an older boiling method using Bauhinia extract is employed.

Average rubber particle size in Funtumia is known to be smaller than that of Hevea. Experiments made with Funtumia latex from Uganda to see if it would behave similarly to centrifuged Hevea skim which, though also difficult to coagulate, reacts well enough with magnesium salts plus sodium silicofluoride, proved unsuccessful. So also did trials with alkaline digestion by proteolytic enzymes prior to use of various coagulants, or with polar-nonpolar fluids. Further work is not thought necessary, since the quality of dry sheet resulting from use of boiling Bauhinia extract is quite good.

Attempts to facilitate collection and preparation of wild rubber, including the use of simple mechanical aids for natives, were not particularly successful. Native labor could probably be better employed on estates. Rehabilitation to maximum production of old and abandoned Ceara plantations in Tanganyika made considerable progress in 1944, but several difficulties were encountered, especially through the tendency of Ceara latex to premature coagulation.

More intensive tapping (up to 200%) proved successful, and with intensities of more than 100% full spiral systems are better than half spirals. A suitable anticoagulant was found to be 10% solution of Magadi soda.

RECENT ADVANCES IN THE PHYSICS AND CHEMISTRY OF RUBBER

3—Ultraviolet Absorption Spectroscopy in Rubber Research

By H. P. KAYE

British Rubber Producers' Research Association, Welwyn Garden City, Herts., England

THE absorption of sunlight by organic matter provides the free energy that ultimately sustains all life, and it is not surprising therefore that modern progress in the chemistry of carbon compounds should have been accompanied by great advances in the technique and interpretation of light absorption measurements. While the appearance of color, due to the selective absorption of some of the wavelengths of white light, has long been employed by the chemist to guide his observations in a qualitative way, quantitative colorimetry and absorption spectroscopy in the visible, ultraviolet, and more recently also in the infra-red, has now become one of the most useful fields of investigation open to those interested in the structure and analysis of organic substances *(1)*. It is the purpose of this lecture to illustrate some of the ways in which the ultra-violet spectrograph may be employed as a valuable aid in rubber research.

The visible spectral region, parts of which are strongly absorbed by typical pigments such as litmus, chlorophyll, or indigo, extends from about 4000 to 7500 Å (1 Å = 10^{-8} cm.), but it is only a comparatively small number of rather complex organic compounds that absorb light in this wavelength range. A much larger number of fairly common substances such as benzene, acetone, or styrene, appear colorless to the human eye and yet display strong absorption bands in the ultra-violet range of 2000 to 4000 Å. The resultant ultra-violet "color" can be measured with the quartz spectrograph just as the green color of chlorophyll may be measured with the visible spectroscope. Furthermore, most pigments absorb ultraviolet as well as ordinary light, and many of the larger quartz instruments cover part or whole of the visible spectrum, so that the great usefulness of ultra-violet equipment in the laboratory may be readily understood.

Much progress has recently been made in elucidating the physical nature of light absorption phenomena, and in the correlation of wave lengths and intensities with specific structural groupings in a compound molecule. While the absorption of infra-red heat radiation is associated with changes in the vibrational and rotational energies of the constituent atoms of a molecule, the frequencies absorbed in the visible or ultra-violet raise some of the electrons in the outer atomic shells to states of higher energy.

From the point of view of the chemist, an important pre-condition of light absorption by organic molecules is the presence of unsaturated double or triple bonds, and it is also generally true that the wavelength, intensity, and characterization (sharpness and subdivision) of the spectrum are all increased by increasing conjugation of any or all such unsaturated bonds in the molecule.

Thus, the saturated paraffins like methane or cyclohexane are completely transparent in the range of the ordinary ultraviolet spectrograph. Unsaturated compounds such as rubber hydrocarbon, isoprene, and benzene, which contain isolated double bonds or systems of two or three conjugated double bonds respectively, absorb light of progressively longer wavelengths. A typical aromatic conjugated anti-oxidant, dinaphthylamine, displays a characteristic spectrum in the middle ultra-violet range. Finally, the tomato pigment looks red because it absorbs light beyond the ultra-violet in the blue region by virtue of a chain of eleven conjugated double bonds in the molecule.

Principles of the Optical System

The optical system of the most common type of spectrograph is essentially similar to that designed by Newton almost three centuries ago for the analysis of white light. A narrow slit is illuminated by a powerful source of ultra-violet radiation such as a high-tension spark between tungsten-steel electrodes or a hydrogen discharge tube, and a beam of parallel rays from the slit, after dispersion by a quartz prism, is eventually focussed to give a virtually continuous spectrum spread out on a photographic plate. If a cell containing a dilute solution of an absorbing substance is now placed between light source and slit, different wavelengths are absorbed with varying intensity so that a characteristic absorption spectrum may be produced on the plate.

The quantitative relationships involved are given by the expression $\log_{10} I_o/I_t = l.c.e.$, where I_o and I_t are the incident and transmitted intensities respectively, l the optical path-length through the absorbing solution of concentration c, and e the characteristic absorption constant of the dissolved substance for the wavelength corresponding to the observed intensities.

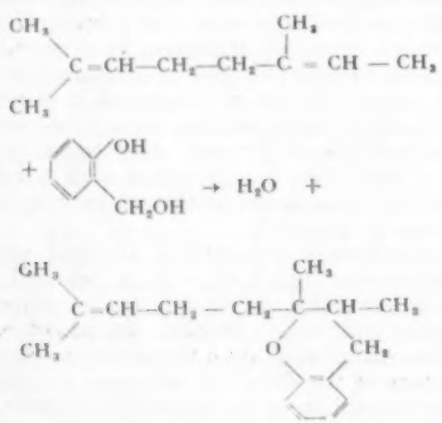
Note: This paper is one of a series based on lectures delivered during 1945-46 by members of the staff of the British Rubber Producers' Research Association at Newton Heath Technical School, Manchester, or before the Leicester Section of the Institution of the Rubber Industry, or under the auspices of the Extra Mural Department of the University of Birmingham.

The spectrograph is usually combined with the Hilger Spekker or a sector photometer, when the optical densities $\log_{10} I_0/I_t$ are read off directly on the instrument and the corresponding wavelengths obtained by a method involving the visual spotting of match-points of equal blackening in two spectra photographed alongside one another on the plate. Complete absorption curves relating intensities with wavelengths may then be plotted from the negatives. The above expression also gives the extinction coefficients e of pure substances, and once these are known for some characteristic wavelengths such as absorption maxima, the analysis of mixtures of absorbing substances often becomes a relatively simple matter.

A more modern type of ultra-violet absorption spectrophotometer, working on the Littrow principle of a rotatable prism with exit slit, has recently been developed by Beckman and is now commercially available in the United States. With this instrument, the percentage transmitted intensity of any wavelength selected by the prism setting is measured directly by means of photo-electronic devices and read off on a galvanometer scale. The accuracy of this instrument is said to be considerably greater than that of the Hilger Spekker photometer which does not normally exceed 2% of the estimated intensity. The Beckman instrument would also appear to be more convenient for specific analytical purposes, although the possession of permanent photographic records is often found advantageous.

A typical example of the determination of molecular structure by ultra-violet spectroscopy is provided by the investigation of the rubber-phenolformaldehyde compounds developed during the war *(2)*. It was desired to know what kind of linkage existed between the phenolformaldehyde groups and the rubber chains in the compound resins. Phenolformaldehyde and rubber both being very large molecules made up of a great number of repeating structural units, it was convenient to study the chemical behavior of the simpler constituent units first. Thus, the 10-carbon di-isoprenic rubber analogue dihydromyrcene and the chemically active unit of phenolformaldehyde, saligenin, were reacted together and two products could be isolated by fractional distillation. Elementary analysis showed that these were formed by the addition of one or two molecules of saligenin respectively to the dihydromyrcene, accompanied by the elimination of water.

It was suspected that addition had taken place at one or both of the double bonds of dihydromyrcene with the formation of so-called chroman rings,



but this could not be proved directly by chemical means. The chroman ring was chemically inert and some positive and specific method of characterization was required. As it happened, the absorption spectrum of a very similar chroman derivative had already been described in the literature and found to be highly characteristic with two sharp peaks at 2775 and 2845 Å.

Evidently this spectrum might serve as a kind of fingerprint to identify the presence or otherwise of the same structural unit in the two new compounds. In fact, the spectra of the dihydromyrcene-saligenin adducts were identical in character with that of the model substance described, while the absorption curves of unreacted saligenin and dihydromyrcene were quite different. As might be expected, the intensities of the two observed chroman spectra were in the ratio 1:2, corresponding to the presence of one or two absorbing units in the compound molecule. Almost identical spectra were also obtained when saligenin combined with rubber itself. The characteristic peaks identified the type of compound formed, and the intensity of absorption could be employed to estimate the extent of combination.

Another structural problem that has been tackled by ultraviolet spectroscopy is the nature of the changes taking place during the atmospheric oxidation of unsaturated hydrocarbons, including rubber. The rapidly oxidizing linoleic and linolenic esters contained in linseed or cotton seed oils were first selected for study as promising materials to establish the general type of reaction taking place *(3)*.

It was found that the combination of quite small amounts of oxygen with the relatively transparent linoleic esters produced intense absorption in the ultraviolet with a maximum at 2315 Å, and also a weaker band near 2750 Å. The intense band could be immediately and unequivocally ascribed to the appearance of conjugated systems of ethylenic double bonds in the oxidized material. Ethyl linoleate contains two isolated double bonds in the molecule, and the marked spectral change must be brought about by moving these bonds into conjugation.

The occurence of such double bond shifts accompanying oxidation had not been previously recognized by other physical or chemical techniques, and it has a most important bearing on the detailed understanding of oxidation processes generally. A study of the weaker band near 2750 also revealed that one of the first products of decomposition of the original peroxide was a ketone.

Application to Rubber Chemicals

Of more immediate interest to the rubber chemist is the application of ultraviolet spectroscopy to the study of antioxidants and vulcanization accelerators. Both these classes of compounds are very intensely colored in the ultraviolet, and quite small amounts contained in rubber mixes can often be conveniently characterized and estimated by the spectrographic method.

The usual procedure is to extract the compounded rubbers with acetone or alcohol, and to identify or estimate the components of the extract by determining its spectrum in an ultraviolet-transparent solvent such as alcohol or chloroform. Some exploratory work along these lines has been carried out at the French Rubber Institute during recent years *(4)*. It was found for instance, that typical anti-oxidants like phenyl-

naphthylamines were left intact during vulcanization and could be quantitatively recovered from the vulcanizate.

Again, the gradual disappearance of the anti-oxidant during aging has been followed spectrographically. Quantitative studies have also been made of the fate of accelerators during vulcanization. If either mercaptobenzothiazole or benzothiazyl disulfide were employed separately, a mixture of these two was invariably produced during vulcanization and could be identified spectroscopically. The action of tetramethylthiuram disulfide was also investigated and it was observed that in the presence of zinc oxide 75% of the added accelerator was converted into zinc dithiocarbamate, identified by its spectrum.

This kind of work is still in its early stages, and much further progress may be expected from the methodical application of ultraviolet spectroscopy. The purity of the organic rubber chemicals employed or the composition of an unknown batch of anti-oxidant may also be readily checked by determining their ultraviolet absorption curves.

Application to Rubber and Plastics

In the field of synthetic rubbers and plastics, considerable use has already been made of spectroscopic methods of analysis and control *(5)*. Butadiene is the starting material for a variety of polymers, and its purity can be conveniently estimated by measuring the strong absorption at 2200 Å due to the conjugated double bonds in the butadiene molecule.

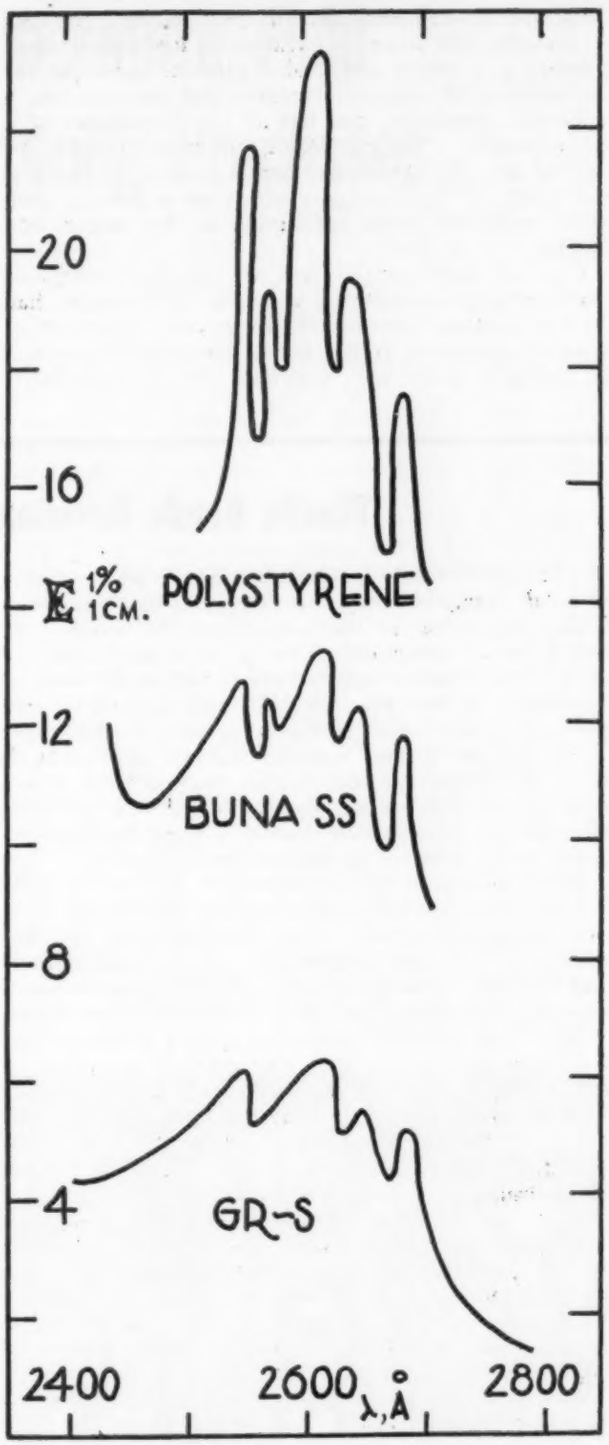
The course of polymerization of styrene has also been followed with the ultraviolet spectrograph, making use of the fact that monomeric styrene has an intense band at 2450 Å due to the conjugation of the benzene ring with the extra double bond, whereas polystyrene absorbs much more weakly near 2600 Å. This residual spectrum near 2600 Å is associated with the benzene rings attached to the polystyrene chain, and it may be applied to the estimation of combined styrene in mixed polymers.

Different types of interpolymers between styrene and butadiene have been analyzed for styrene content in this manner, the absorption of the butadiene component of the polymer being inappreciable near 2600 Å.

The accompanying sketch shows the absorption spectra of three styrene-containing polymers in cyclohexane solution, drawn on the same intensity scale. Taking the maximum absorption of pure polystyrene as standard, the styrene content of the two typical synthetic rubbers illustrated works out to over 50 and 24%, respectively. The accuracy of such an analysis may be as high as 1%, provided suitable precautions are taken.

It is essential to extract the polymer thoroughly in order to remove traces of free styrene or anti-oxidants which would interfere. After thorough drying, a dilute solution of known concentration (about 0.1%) is made up in cyclohexane or chloroform, and the actual intensity determination at 2600 Å can be accomplished within five or ten minutes. If the polymer should be very insoluble, light milling will usually overcome this obstacle. The same method of analysis can also be applied to the estimation of GR-S in mixes with natural rubber.

Finally, it may be said that ultra-violet measurements often provide a much more sensitive criterion of purity than any other known method. Just as subanalytical traces of picric acid or typical dyestuffs may impart a perceptible color to a solution, so it is found that the presence of traces of nitrogenous matter or oxygen in rubber hydrocarbon will exert a distinct effect on the ultra-violet transmission of its solutions. Moreover, it is frequently possible to identify a trace impurity by its characteristic spectrum and to devise appropriate methods of purification.



Absorption spectra of three styrene-containing polymers in cyclohexane solution.

An attempt has been made in the foregoing remarks to illustrate the scope of ultra-violet absorption spectroscopy as a simple and reliable physical technique for the analysis of organic structure and composition, a technique, moreover, that has all the advantages of a micro-method. In conclusion, it must equally be pointed out that there are some inherent theoretical and practical disadvantages which set a definite limit to its more universal application in the rubber laboratory.

One of these is the lack of specific absorption characteristics encountered in nearly all molecules that do not contain systems of conjugated unsaturation. Another drawback is the almost inescapable necessity of having to work with solutions only, if quantitative intensity estimations are desired.

Fortunately, it is just in these respects that infra-red absorption spectroscopy holds out great promise, and there seems little doubt that a combined attack from the two invisible ends of the light spectrum could solve many problems that will engage the rubber chemist in the future.

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Plastic Bonds Resistant to Temperature Changes

SATISFACTORY bonding between a plastic and a metal facing or metal reinforcement has been practically impossible in the past, primarily because the two types of materials differ in their coefficients of expansion. Plastics have relatively high coefficients of expansion, in contrast to metals, and changes in temperature create forces that prevent satisfactory bonds. Investigations at the National Bureau of Standards by P. S. Turner of the Plastics Section have shown that the coefficients of thermal expansion of components can be matched, giving a bond between the components resistant to temperature changes.

Bonds produced by adhesives fall into two classes: the rubbery or yielding bond and the rigid bond. The first category includes most thermoplastic cements, rubber cements, and combinations of thin rubber layers and cements. These adhesives provide durable bonds between dissimilar materials at moderate temperatures.

The rigid bond has generally proved unsatisfactory for such applications with the possible exception of cold-setting cements of phenol-formaldehyde and urea-formaldehyde types. At reduced temperatures, however, the yielding adhesives lose their ability to eliminate stress concentrations by yielding with the dimensional changes of the materials bonded.

If it can be obtained, the rigid bond is superior for many purposes because it produces a stronger and less-yielding product. For composite structural material subjected to extreme temperature changes, a stable rigid bond is imperative. The solution lies in the matching of thermal-expansion coefficients of the components.

The formula developed by Turner indicates that the resulting volume thermal coefficient of a mixture

$$\beta_r = \frac{\frac{\beta_1 P_1 K_1}{d_1} + \frac{\beta_2 P_2 K_2}{d_2} + \ldots + \frac{\beta_n K_n P_n}{d_n}}{\frac{P_1 K_1}{d_1} + \frac{P_2 K_2}{d_2} + \ldots + \frac{P_n K_n}{d_n}}$$

where β is the coefficient of cubical thermal expansion, K is the bulk modulus, P is the fraction or per cent by weight, d is the density, and the numerical subscripts refer to the particular constituents while r refers to the resultant mixture. Since the coefficient of linear expansion is directly proportional to the cubical coefficient, a substitution of the former in the above equation is possible. Moreover, for a mixture whose components have nearly equal values of Poisson's ratio, Young's moduli may be used in place of the bulk moduli.

The formula has been used successfully in a number of applications. A mixture of polystyrene and aluminum oxide, for example, was determined in this fashion so that brass inserts were feasible. Brass inserts in ordinary polystyrene cause the polystyrene to crack as a result of the differences in thermal-expansion coefficients. The coefficient of linear expansion of polystyrene is approximately 70 x 10^{-6} per degree Centigrade while that of brass is about 17 x 10^{-6}.

Fused aluminum oxide was chosen for use in the mixture because it has a low coefficient of linear thermal expansion—8.7 x 10^{-6}—and a high modulus of elasticity compared to its density. Its choice for use with polystyrene was also determined by its desirable electrical properties, and there was no appreciable change in the electrical resistance of polystyrene on addition of the filler.

Calculations revealed that approximately 90 per cent of polystyrene and 10 per cent of aluminum oxide would be required to match the coefficient of linear thermal expansion of brass. Analysis with polarized light indicates that there are stresses in the pure polystyrene concentrated at the boundaries between the brass and polystyrene, and these are sufficient to rupture the polystyrene. With about 10 per cent of fused aluminum oxide filler, such stress concentrations are absent and there is no evidence that the filled styrene has fractured. The brass was sufficiently well bonded to the polystyrene to permit sawing and machining of the composite material.

Rivet fillers for aluminum, used to cover the depressions caused by riveting, have also been developed by this method as well as a mixture of glass fiber and phenolic resin designed to match aluminum alloy metal reinforcing plates. The technique permits the formulation of pigmented protective coatings that have satisfactory adhesion to the coated material.

In general, the method provides information leading to the proper combination of materials for a matching of thermal coefficients, which in turn yields stable bonds even between large sections and over extreme temperature changes.

Use of High Temperature Fluid in Rubber Manufacturing Processes

By PAUL L. GEIRINGER

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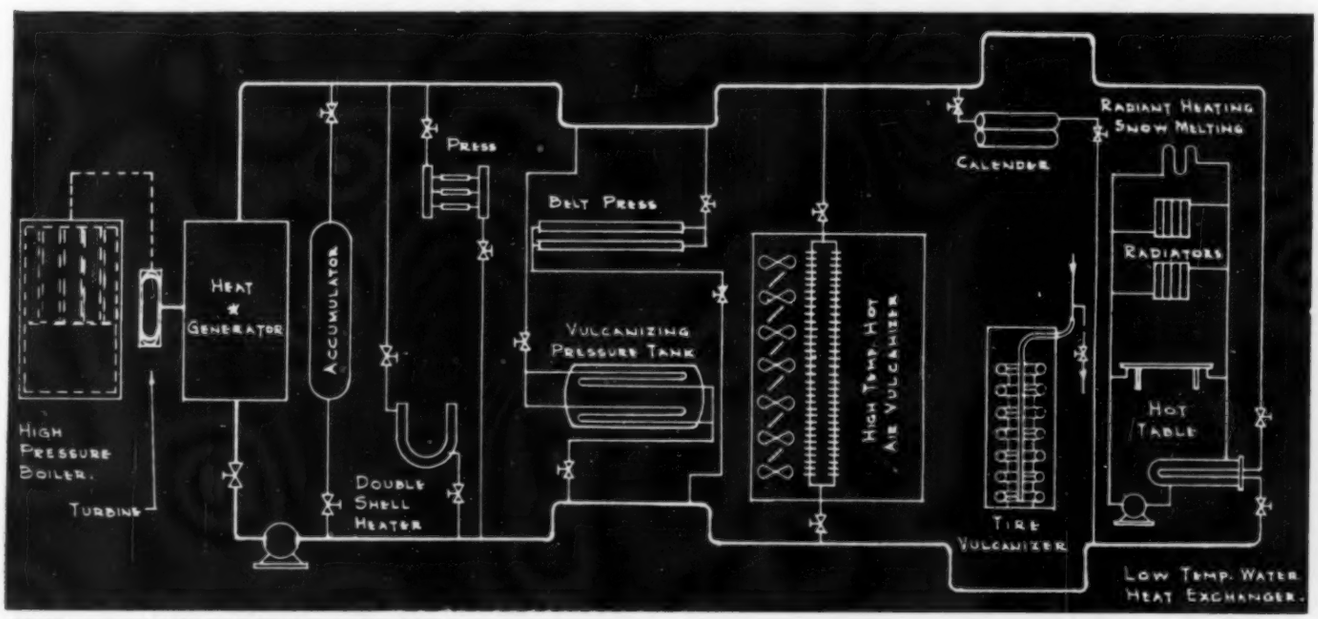
ALTHOUGH the use of high pressure steam in industry has some advantages, its numerous disadvantages point the way to the applications of high temperature fluid, particularly in the rubber and plastics fields. A number of progressive rubber plants in Europe have already installed this type of heating system, securing advantages in the processing of rubber by better controlling temperatures and achieving considerable savings in fuel.

In the author's opinion, most processes for heating and vulcanizing of rubber goods can be operated better and more efficiently by means of high temperature fluid heating. In the temperature range up to 400°F. the most economical means is to use water as a heat transfer fluid. Beyond this range, chemicals may be used as a heat carrier. There are a number of chemicals on the market which can be applied for this purpose, but water is the "chemical" best suited as a heat carrier for rubber factories. It is cheap, non-inflammable, non-toxic, has an excellent heat transfer rate and the highest specific heat.

Principle of "Hydrotherm Heating"

Among the hydrothermal heating methods is the "Hydrotherm Heating" method. The principle of the operation of this method as applied to the rubber manufacturing industry is illustrated in Fig. 1, which shows platen presses, tire vulcanizing presses, calenders, and other equipment utilized in the average rubber plant. Fig. 2 shows a Hydrotherm direct contact heater as installed in a European rubber plant using bleeder steam from the turbine for high temperature water generation. The pumps used for circulating the heating fluid are also visible in this illustration.

The principle of operation of high temperature Hydrotherm heating, where fluid heating between 200° and 400°F. is concerned, may be explained as follows: In order to generate hot water of more than 212°F., the pressure in the generator must be increased accordingly. This can be achieved by heating the fluid in an entirely closed system, or any conventional steam boiler can act as a high temperature generator. As indicated in Figs. 1 and 2, special high temperature water direct contact heaters can be used for transforming exhaust or bleeder steam from engines and turbines into high temperature water. The water is drawn from the boiler or generator by means of immersion tubes and flows to the heat consumers, where it gives up heat. It is then returned to the generator or boiler for reheating. Circulation through the system is maintained by a special pump.



* Boiler or special Hydrotherm heat producer.

FIG. 1—Principle of operation of the Hydrotherm Heating method as applied to presses, vulcanizers, calenders, and other rubber processing equipment. (Flow temperatures of 300° to 400°F.).

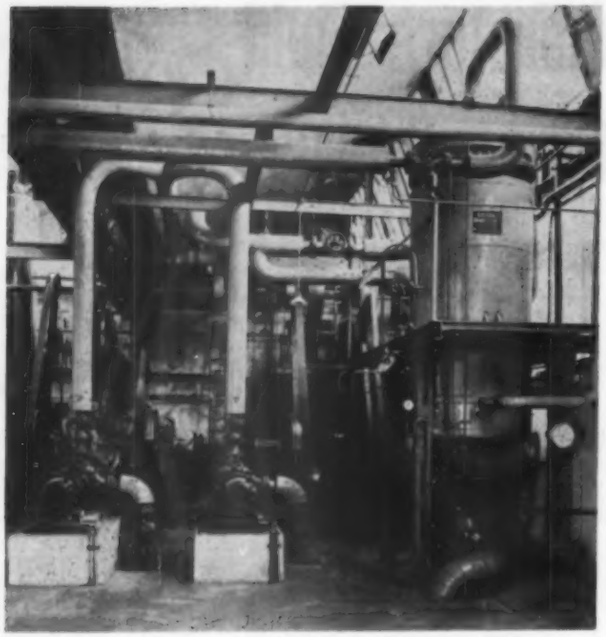


FIG. 2—Installation of a Hydrotherm direct contact heater in a European rubber plant using bleeder steam from the turbine for high temperature water generation. The pumps used for circulating the heating fluid are also visible.

Advantages of such a heating system are numerous. For example, high temperature water of 300° to 400°F. used as a heat carrier permits the installation of considerably smaller pipes as compared to those required for steam. Installation can be undertaken without regard to pitch. In new factories, the builder and structural engineer will greatly appreciate being relieved of all worry concerning the piping arrangement in trusses, where at times fractions of an inch prevent proper pitching of steam and condensate piping.

The system can also be installed overhead without regard to leveling, or in small shallow trenches following the contour of the ground surface. It is welded to assure smoothest flow conditions and maximum tightness. Expansion loops and bends replace all expansion joints. No traps, strainers or similar devices have to be contended with. Shut-off and control valves only are required for controlling heat to equipment. Obviously, the amount of capital investment required is reduced substantially.

The Hydrotherm heating method also offers advantages where temperatures between 400° and 700°F. are concerned. For processing temperatures higher than 400°F. special fluids are used as heat transfer media. These fluids combine the advantage of low pressure with high temperature. The liquid state is maintained despite the high temperature. Temperature levels up to 700°F. can be reached in this way. The chemical consistency of the fluid is especially protected due to the fact that the liquid state is never abandoned. The pipe lines are smaller and operation simplified.

Over-All Advantages of the System

As previously stated, the high temperature water system is an entirely closed circuit. Consequently, all heat exchanging surfaces remain free from scale and rust, thereby improving considerably the rate of heat transfer. The mean boiler water temperature is lowered by using the boiler for high temperature water heating. This fact as well as the scale free boiler surface increases the boiler efficiency. Radiation losses from the piping are smaller. Water may be lost through loose stuffing boxes; however, the amount of make-up water required, if any, is negligible. No water purification or make-up water treatment is required.

Use of the system practically eliminates maintenance work. The elimination of boiler and make-up water treatment, as well as condensate collecting and boiler feeding equipment, saves operation and maintenance costs. The electric current consumption for pump operation is relatively small because the pump has solely to overcome the friction resistance of the piping system. It is usually smaller than any current required for boiler feeding equipment.

Additional economic advantages are obtainable by

FIG. 3—Series of platen presses in a European rubber plant heated by the Hydrotherm method. The method makes it possible to maintain an even temperature over the entire surface of the platens.

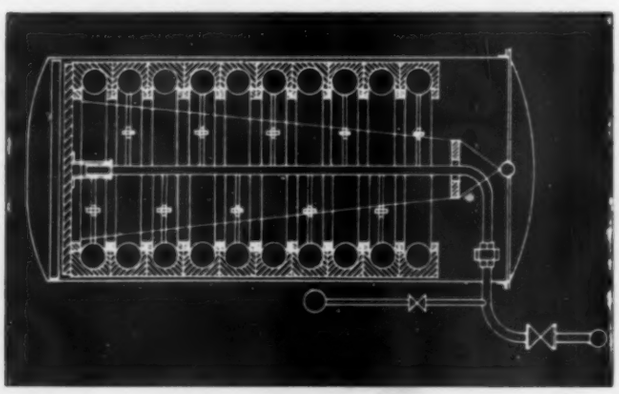


FIG. 4—Drawing of a tire vulcanizing system equipped with Hydrotherm heating, utilizing high temperature and high pressure simultaneously to increase the speed of vulcanization.

installing in the circuit high temperature accumulators. Wherever the use of such accumulators is indicated—with or without simultaneous power generators—the boilers can be relieved of peak loads. This assures uniform boiler operation at highest efficiency.

The close temperature control of all processes is of great value. The equality obtained in the temperature field of platen presses, for example, is unparalleled by any other heating method. Higher and more even temperatures can be obtained for all vulcanizing processes. Fig. 3 shows a series of platen presses in a European rubber plant which are all heated by the Hydrotherm method. Fig. 4 is a drawing of a tire vulcanizing system equipped with Hydrotherm heating, utilizing high temperature and high pressure simultaneously to increase the speed of vulcanization.

In conclusion, it should be emphasized that fuel savings of 25 to 40% have been recorded by high temperature fluid systems which have replaced ordinary high pressure steam installations, while maintenance expenses have been practically eliminated. These important savings justify the replacement of existing steam systems with high temperature water systems and the incorporation of the latter in new plants.

Use of the Amberols in Synthetic Rubber Stocks

SYNTHETIC resins, like synthetic rubbers, offer a wide range of properties and show a varying degree of tackiness according to their composition. This tackiness is unlike that of natural rubber in that the tacky resins will adhere to any material as well as to themselves. In the compounding of rubber, tackiness is desirable only during the plying-up operations and excessive tack, as is well known, causes difficulty in milling, mixing and other operations. Therefore, the use of synthetic resins as tackifiers has been quite limited until it was recently discovered that certain resins which in themselves were not tacky imparted the desirable quality of building tack to synthetic rubbers.

Included among the synthetic resins which impart building tack to synthetic rubbers are the Amberols, products of the Resinous Products & Chemical Co., Philadelphia, Penna. The company recently launched a series of investigations to determine which of the Amberols worked best in synthetic rubber stocks, and the following report of results obtained is taken from the November, 1946, issue of *The Resinous Reporter*, the company's house organ:

Of the various resins investigated, Amberol M-93 and ST-137X proved to be particularly efficient. Amberol M-93 is a modified phenol formaldehyde resin which was developed for use by the coatings industry in the manufacture of varnishes and enamels where outstanding alkali resistance was required. Amberol ST-137X is a non-reactive unmodified phenol formaldehyde resin which is used in oleoresinous varnishes where outstanding durability and alkali resistance are essential qualities. Both resins are supplied in lump form and because of their excellent solubility in petroleum hydrocarbons can be dispersed readily in synthetic stocks.

Results with Gum Stocks

Preliminary tests to determine the tackifying efficiency of Amberol ST-137X were conducted in gum (unfilled) GR-S stocks. The results were very promising and so experiments were continued using carbon black-loaded stocks. Since GR-S gum stocks, as such, find little application in industry, pigments and vulcanizing agents were omitted to reduce the number of variables in the test procedure. The following formulation (by parts) was employed for the GR-S-carbon black stocks: GR-S, 100; Amberol ST-137X, 8; zinc naphthenate, 2; carbon black, 50.

The vulcanizing agents were omitted, since no curing studies were conducted. The GR-S was broken down fifteen minutes on cold tight rolls and other ingredients were added in the order listed and milling was continued for thirty minutes; then the stock was allowed to stand for two hours. These stocks were compared with stocks using 10 percent of other tackifying agents in GR-S in the same formulation. The experimental method consisted of rolling together with a hand roller strips cut from thin sheets and then determining the force required to delaminate. In all cases, Amberol ST-137X gave a stock with equivalent or superior building tack to stocks formulated with other tackifiers.

Results with Butyl Compounds

Use of the Amberols in GR-I (butyl) stocks was also investigated. Again, Amberol M-93 and ST-137X showed excellent results and were far superior to other types which were evaluated. Amberol M-93 showed remarkable ability, even when used in small proportions, to inhibit cold flow and to provide a degree of cohesive strength not offered by the base polymer. When used in higher ratios, the resin caused some retardation of cure and diminished compatability. While Amberol M-93 did not improve tack to any extent, the other improvements were so impressive that it was decided to overcome the lack of tack by other modification. When Amberol ST-137X was used in butyl rubber with Amberol M-93, milled stocks resulted which were very tacky and high in adhesive strength. No effect on curing characteristics was noted and the compatability of the resin with the butyl rubber was excellent even in high ratios.

Some work was also done on butyl cements. The usual cement used for combining fabrics, splicing of butyl inner tubes, etc., is about 20 percent solids, dispersed in aliphatic hydrocarbons such as naphtha or benzene. Amberol ST-137X is highly soluble in both naphtha and in butyl rubber itself, with the result that cements in which the resin is incorporated are clear and very fluid, whereas other resin types yielded gelatinous solutions. The solubility of Amberol M-93 in aliphatic hydrocarbons is somewhat limited and tends to restrict its compatability with butyl rubber in high ratios. This condition is readily overcome by using a small amount of a higher solvency hydrocarbon to disperse the Amberol M-93.

Use of the Multipress in Cutting Test Specimens

By ELLSWORTH E. McSWEENEY and LA VERNE E. CHEYNEY
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IT is recognized that variation is found among specimens prepared in various laboratories for testing of rubber according to A.S.T.M. procedures. Some of these variations may be due to differences in the method employed for cutting the specimen, since the standard procedure describes only the die and qualitative features of the cutting procedure.

Several methods of cutting test specimens are regularly employed in rubber laboratories: (1) A mallet is employed to strike a maul-handled die; (2) A hand-or-foot-operated arbor press is employed; with either a flat-top die or one having a maul handle; and (3) The "clicker," a semi-automatic punching machine employed in the shoe industry, is used in a few laboratories.

The last of these methods is the only one which gives a reproducible stroke. The instrument is somewhat expensive and has little other application in the usual rubber laboratory; in addition, its use is somewhat time-consuming, since its arm must be swung out of the way each time the die is moved to a new position. It has only recently become generally realized that a hand- or foot-powered cutting stroke leads to nonuniformity of samples and to consequent serious variation in test results.

It has been found that the Multipress (trademark of the Denison Engineering Company) is a commercially available machine, adaptable to the cutting of such test samples. Like the "clicker", it is somewhat too expensive to justify its purchase for this use only. However, the Multipress is a versatile instrument which adapts itself to many other uses in the laboratory.

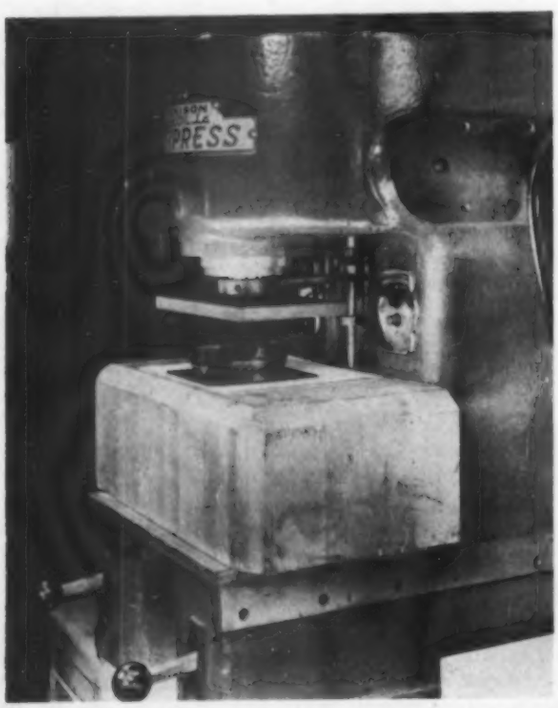

FIG. 1—Multipress adapted for cutting rubber specimens

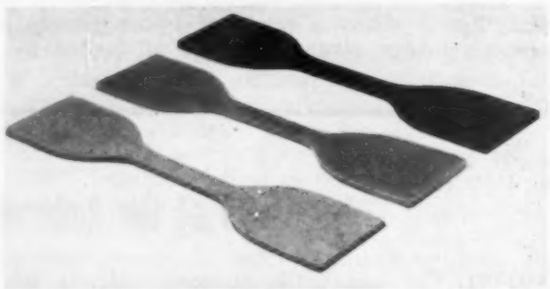

FIG. 2—Test specimens cut with the Multipress

The essential feature of the machine is a hydraulically operated ram, which can be regulated to apply various pressures at various speeds. Standard models are equipped with dual hand-lever controls, which assure maximum safety and allow control of ram speed. Limits of ram travel in either direction are controlled by adjustable stop-collars. The basic 4-ton unit delivers its maximum pressure at a uniform speed (200 inches per minute), resulting in the application of a uniform cutting stroke.

The unit pictured in Fig. 1 has two readily removable additions: (a) the end-grain wood block, which is mounted under the sample; (b) the threaded plate, which screws into the inside-threaded ram head. Both of these parts are readily removed when it is desired to use the unit for other work. Actual ram travel beyond the distance necessary to cut the sample is prevented by the adjustable stop-collar. This results in preservation of sharp die surfaces, as compared with the usual hand or foot procedure.

The instrument may be employed for a wide variety of other applications in the plant or laboratory, wherever the application of uniform or cycling pressure is desired. Stamping, cutting, preforming, pressing, and molding operations are a few examples. One laboratory has fitted the ram and base with steam-heated platens which may be used for molding and curing operations. A unit of this type has been adapted in this laboratory for use in high-pressure hydraulic cycling tests.

Fig. 2 illustrates the type of test samples obtained with A.S.T.M. die C (A.S.T.M. Standard D412-41). These represent, respectively, a pure gum-type stock, a plasticized vinyl composition, and a phenolic resin-nitrile rubber blend with a Shore hardness of 99 [J. W. Ferguson, *India Rubber World*, 114,218 (1946)]. Only in the last sample was there microscopic evidence of slight dimensional difference across the cut edge. It is generally agreed that samples of this last type are difficult to cut by any means without some flow under the die. Examination of the other samples failed to reveal any significant dimensional variation.

Medical Protection in Solvent Operations

By LILLIAN GORDON

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ONE of the industrial hygiene problems associated with the manufacture of synthetic rubber and the fabrication of various rubber parts is the need for protecting workers from the effects of organic solvents. Solvent-using operations, it is well known, may give rise to vapor poisoning or dermatitis, unless proper controls are instituted.

Specifically, potential solvent hazards have been recognized in operations such as the manufacture of synthetic rubber, the coating of fabrics (as in the manufacture of raincoats), and the fabrication of rubber parts, such as airplane fuel tanks, balloons, rubber boats, pontoons, gaskets and packings. In these operations, a variety of organic solvents is used, including petroleum naphtha, benzene, toluene, xylene, ethylene dichloride, propylene dichloride, trichlorethylene, carbon tetrachloride, monochlorobenzene, methyl ethyl ketone, and butanol.

The basic form of protection for the worker in solvent operations is the application of adequate engineering controls, especially the use of enclosed processes and well designed ventilating equipment. There are also valuable auxiliary devices, such as protective clothing and respirators, which are used to advantage.

Another aspect of the solvent safety program which is being given greater attention today is medical protection. The medical program, when properly organized, can do much to prevent illness, to avoid serious results where incipient illnesses do arise, and to serve as a method of checking on the adequacy of the engineering controls provided. Moreover, a well planned medical program will afford protection not only from solvent troubles but from other toxic products as well. Various monomers, such as styrene and particularly acrylonitrile, present health hazards as potentially serious as do the organic solvents.

The scope of the medical program must be adapted, of course, to the size and needs of each plant. Some plants require a full-time medical staff. Others find a plant nurse, supplemented by a visiting or consulting physician, sufficient. In any case, the necessary components of the medical program may be outlined as follows.

The Pre-Placement Examination

Certain individuals are unusually susceptible to the effects of organic solvents. They may be allergic to the liquid, so that they develop skin rashes. Or they may be very sensitive to the vapors and become ill under normally safe conditions. This is particularly true of alcoholics and of individuals with diabetes, liver damage, or other organic irregularities.

If such persons are placed in a solvent-using department, they may become seriously ill even if all the necessary controls are provided and the working conditions are entirely safe for normal individuals. A case of illness, under these circumstances, is not only expensive, but most unfortunate from the point of view of the morale of other workers. One "scare" case of this type has been known to start a wave of panic throughout a large plant.

By means of the pre-placement examination, it is usually possible to discover solvent-sensitive individuals and thus avoid placing them on or near solvent operations. In this way, the worker is protected from illness and management avoids the wasteful training of individuals who must soon be replaced.

Regular Medical Examinations

Early symptoms of solvent illness may easily be overlooked by a worker or attributed to some other cause. For example, dizziness, nausea or a "tired feeling" may be blamed on lack of sleep, bad food, etc., whereas these are often warning signs of solvent poisoning.

By means of regular medical examinations, it is possible for the physician to recognize early symptoms of solvent illness. Early recognition of illness is most important, since prompt treatment usually leads to complete recovery, whereas continued exposure, without treatment, may cause damage to various organs of the body.

Prompt treatment of dermatitis usually permits the worker to continue on the job without interruption. Neglected cases, on the other hand, are very difficult to cure, causing long absence from work and occasionally making it necessary to transfer the worker to another job altogether.

Early discovery of a case of solvent illness also protects other workers in the same department, since it is an indication that something may be wrong with the ventilating equipment or some other aspect of process control.

The Clinic

Where solvent operations are in use, it has been found that a clinic, or first-aid room, with a trained nurse or physician in attendance, is a most valuable factor in preventing serious results from solvent exposure. Accidental exposure to high concentrations of solvent can give rise to acute solvent illness and in such cases prompt first aid is of primary importance as a life-saving measure.

The first-aid room should be readily accessible at all times, to prevent delay. Where a plant is very large, involving several buildings, local first-aid stations are usually placed in every building, with someone available for immediate application of first-aid treatment.

An easily accessible clinic also has the advantage of encouraging employees to report early signs of illness, which may otherwise be ignored until serious damage is done. Similarly, it provides a place where workers can report signs of skin irritation and receive the treatment necessary to prevent aggravation of the condition.

Education of the Employees

As in the case of other parts of the safety program, employee education is an important part of the medical program. The education of employees in proper living habits, both on and off the job, contributes to the well being of both workers and plant.

Workers on solvent operations should be informed that personal cleanliness is a vital factor in reducing the incidence of dermatitis. A well balanced diet is particularly important in minimizing the possibility of vapor poisoning. Instances may be cited in which workers on a well balanced diet remained well in an atmosphere where others, living mostly on starches or fats, became seriously ill. The drinking of considerable quantities of alcohol, especially shortly before (i.e., the night before) handling solvents, can make an individual considerably more susceptible to vapor poisoning.

Coordination with Other Parts of Program

The medical program is naturally only one aspect of the broad safety program needed to protect the health of workers in departments handling potentially harmful chemicals. The effective operation of the medical department, requires cooperation from the safety engineer or foreman. Thus, the medical department should be informed of all health hazards likely to be present. Any change of operations, or the introduction of new chemicals, should be immediately reported to the medical department.

The medical department, in turn, can contribute to other parts of the safety program. The reporting of an illness may be the first indication that ventilating equipment is inadequate. Frequent cases of dermatitis in one department may show that the solvent-handling process needs redesigning. Occasional complaints of headache, etc., from a solvent-using department may indicate that while engineering controls provide *safety*, they do not provide the *comfort* required for maximum productivity and well being among employees.

Where properly introduced as a means of protecting employee health and preventing accidents, the medical department can gain the confidence and respect of workers and aid immeasurably in obtaining employee cooperation in the safety program.

Recent German Developments in the Manufacture of Vinyl Plastics

RECENT German developments in the manufacture of vinyl plastics are described in a report on the polyvinyl chloride industry now on sale by the Office of Technical Services, Department of Commerce. German techniques for rolling and finishing thin, flexible plastic sheets are of particular interest, according to the authors of the report, members of the British Intelligence Objectives Sub-Committee. Further data on German polyvinyl chloride, as well as on styrene products and plastic slide fasteners, are also available from OTS in a report by Ernest W. Halbach, investigator for OTS' Technical Industrial Intelligence Division.

Polyvinyl Chloride Sheets

The manufacture of calendered polyvinyl chloride sheets by the Dynamit firm at Troisdorf is described by the British investigators. Unplasticized polyvinyl chloride has been used widely in Germany for shoe soles. Plasticized polyvinyl chloride rolled into thin sheets is used for waterproof garments and protective coverings. Vinyl chloride, mixed with 20 percent methyl acrylate, is rolled into sheets. This transparent material is called "Astralon" and is used for photoreproduction work, mechanical drawing materials, and other purposes requiring a clear tough sheet.

Rolled sheets of these plastic materials were put through a calendering machine to obtain a good finish. A difficulty was that the bending of the calendering cylinders under the stress of rolling caused unevenness in the plastic sheets. This was remedied by a method of skew-setting the rolls, devised by Eck und Sohn, machinery manufacturers in Duesseldorf. Though the rolls were set in closed vertical frames, they could be adjusted horizontally by moving the bearings of the rolls forward or backward in horizontal slides. For example, by slightly skewing the set of Roll 3, the space between it and Rolls 2 and 4 could be increased at the ends, to counteract the slight bowing at the middle of the rolls.

This skewing technique had not worked to the entire satisfaction of the engineers at Troisdorf. They claimed that this was probably due to inferior wartime materials used in the machinery and to mechanical difficulties which could be ironed out.

The British investigators point out that another solution to this problem is to use rollers which have a slight bulge toward the middle. The Eck skewing technique, they state, may permit finer adjustments and can take into account the various degrees of bend resulting from rolling plastics of different thickness and hardness.

Thin plastic sheets also were made experimentally by extruding mixed soft polyvinyl chloride directly onto the calender rolls. The results were encouraging, but wartime difficulties prevented further development of the process.

Additional Items Described

In addition to these subjects, the British report describes the printing of thin plastic sheet for raincoats, curtains, table covers, and other household items; the production of plastic cable coverings, double screw extrusion machinery, compression and transfer molding; and the composition of phonograph records.

The British report is entitled "Processing of Polyvinyl Chloride"; (PB-31,253; photostat, $10; microfilm, $3; 146 pages, including photographs and diagrams). The U. S. report is entitled "Miscellaneous Chemical Processes"; (PB-34,808; photostat, $3; microfilm, $1; forty-three pages, including diagrams).

Orders for these reports should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Division of High-Polymer Physics, A. P. S., Schedules a Three-Day Technical Session

THE Fourth Meeting of the Division of High-Polymer Physics of the American Physical Society will be held at Columbia University in New York City on January 30, 31 and February 1 in conjunction with the annual meeting of the parent society. Sessions will be held Thursday morning and afternoon, January 30, and on Friday and Saturday morning, January 31 and February 1, respectively. Eighteen technical papers on the general theory of high-polymer phenomena and on the mechanical and electrical properties of rubbers and plastics will be given. The sessions will start on Thursday morning, January 30, with an address by H. A. Robinson, of the Armstrong Cork Co., the retiring chairman of the Division. Election of new officers will be held during the meeting. Abstracts of 16 of the 18 papers scheduled for presentation, together with the names of the authors and their company connections, follow herewith:

ABSTRACTS OF PAPERS

Thursday Morning—January 30

The Determination of Macromolecular Configurations in Dilute Solution by Light Scattering. *P. M. Doty, W. A. Affens, and B. H. Zimm (Polytechnic Institute of Brooklyn, Brooklyn, N. Y.).*

The interference pattern produced by monochromatic light scattered from solutions of fractionated polystyrene has been studied. In particular, the dissymmetry coefficient of Debye, the fractional difference of the intensities of the light scattered at two different angles, has been investigated as a function of concentration, of solvent, and of molecular weight of the polymer. The variation with concentration is large and is characteristic of the particular solution, but it was found possible to extrapolate to infinite dilution to obtain a coefficient characteristic of the polymer alone.

From this limiting or "intrinsic" coefficient the root-mean-square distance, R, between the ends of the chain molecule may be calculated by exact equations. It was found that R varied as the square root of the molecular weight, as predicted by the theories of chain statistics, but that it was only slightly dependent on the nature of the solvent. On the other hand, the intrinsic viscosity of the same materials was markedly dependent on the nature of the solvent. Some typical data are shown below:

Polystyrene Molecular Weight	Solvent	R	Mol. Wt./R^3	Intrinsic Viscosity
4,800,000	Toluene	2370Å	...	7.6
4,800,000	Butanone	2100Å	1.10	2.3
11,800,000	Butanone	2770Å	1.53	4.10
2,100,000	Butanone	1230Å	1.38	1.45

The Relation Between Intrinsic Viscosity and Molecular Weight in Polymer Solutions. *P. Debye (Cornell University, Ithaca, N. Y.).*

If a polymer molecule of the coiling type suspended in a liquid is exposed to forces due to a flow-pattern of the liquid as used in viscosity measurements, its center of gravity will move with the liquid and at the same time the molecule as a whole will rotate with an angular velocity determined by the velocity gradient. Notwithstanding this adaptation of the motion of the molecule to that of the liquid a relative flow of the liquid with respect to the molecule remains. With the assumption that the average density in space of the polymer molecule is so small that its disturbing effect on the motion of the liquid can be neglected it can be shown that the intrinsic viscosity of a solution will be proportional to the average square of the distance of the average monomer-group of the chain from the center of gravity of the whole molecule. This means that in this approximation Staudinger's rule should hold which makes the intrinsic viscosity proportional to the molecular weight.

However, neglecting the disturbing effect of the molecule on the regular flow pattern of the liquid is too poor an approximation. A mathematical method has been developed which makes it possible to take care of this disturbance. The final conclusion is that the intrinsic viscosity depends on 2 fundamental constants, each of the dimension of a length, which characterize the molecule.

The first of these constants is the familiar average distance D between the two ends of the chain or the corresponding spherical volume proportional to the third power of D, which can be taken to represent a measure for the average volume occupied by the polymer molecule in the solution.

The second constant is a length L, determined by the average density with which the molecule fills its allotted space. It is a measure for the distance over which the outside velocity distribution makes itself felt into the interior of this space.

The intrinsic viscosity is represented by a product of which the first factor is the specific volume of the molecule defined as the volume occupied divided by the mass of the polymer molecule. The second factor is a relatively simple function of the quotient D/L, a quantity which I would like to call the "shielding ratio." It turns out that for a linear polymer the intrinsic viscosity is proportional to the molecular weight (Staudinger's rule) for small values of the shielding ratio, whereas for large values of this ratio it becomes proportional to the square root of the molecular weight. In an intermediate case the curve can be approximated over a large range of molecular weights by the customary power-function. The exponent has some value intermediate between 1 and 1/2 and is determined by the shielding ratio.

Discussed in this way measurements on intrinsic viscosity give information about the actual size of the polymer molecule in solution and its change with the solvent. As already indicated by measurements on the dissymmetry of light scattering it is found again that D is a good deal larger than would be expected from Eyring's theoretical formula (no interaction, free rotation). The way is also opened to the use of viscosity measurements in order to obtain information about branching, since branching will affect the space-density of the polymer molecule, which determines the shielding ratio.

Time-Dependent Strain Birefringence in Viscoelastic Materials. *Turner Alfrey, Jr. (Polytechnic Institute of Brooklyn, Brooklyn, N. Y.).*

The phenomenological theory of strain birefringence in viscoelastic materials is developed. The material is assumed to be homogeneous, amorphous, and (in the unstrained state)

isotropic. The purely mechanical behavior is assumed to be representable in terms of a distribution of mechanical relaxation times, i.e., the material obeys the Boltzmann superposition principle. Each molecular mechanism of mechanical response to stress will have associated with it a certain strain-optical constant. This results in a definite pattern of (time-dependent) birefringence when stresses are applied. The theory has two possible applications: the use of photoelastic creep studies in the investigation of *molecular mechanisms* of viscoelastic behavior, and analysis of the optical creep effects which may occur when imperfectly elastic materials are used in photoelastic studies of stress distributions.

Thursday Afternoon—January 30

Velocity and Attenuation of Sound in Rubber. ***W. B. Thompson, B. A. Mrowca, and Eugene Guth (University of Notre Dame, South Bend, Ind.).***

Velocity and attenuation of sound in rubber strips were investigated by the standing wave method suggested by Bridgman and Brueblood, developed to measure the dynamic modulus by Silverman and Ballou, and extended by us and Nolle and Bolt (M.I.T.) to measure also attenuation. Amplitude of vibration in this method is below 0.001%. Velocity and attenuation of sound both decrease with temperature and with frequency in the range 500-6000 cycles per second for Hevea and synthetic gum stocks.

From the velocity and attenuation of sound the dynamic modulus and internal friction constant were derived, assuming a proportionality of the viscous forces to the rate of deformation. Both the dynamic modulus and internal friction decrease with increasing temperature. The former fact is in contrast to the increase of the static and dynamic modulus at large amplitudes predicted by the statistical theory of rubber elasticity and confirmed by experiment. Probably for such small amplitudes the intermolecular theories chiefly determine the temperature dependence of the dynamic modulus for rubber just as for all other materials.

Although the measurements at Notre Dame were checked by those at M.I.T., both groups feel that more accurate data are needed before final conclusions can be reached, particularly about the temperature dependence of dynamic modulus. Financial support of ONR, Navy Department, is gratefully acknowledged.

Elastic Losses of Natural and Synthetic Rubber as a Function of Frequency and Temperature. ***H. S. Sack and H. L. Raub (Cornell University, Ithaca, N. Y.).***

The elastic losses of unloaded samples of natural rubber and synthetic rubber of the GR-S type containing different amounts of styrene were measured.

The sample, in the form of a reed, is acted upon by an alternating force of constant amplitude and adjustable frequency. The motion of the end of the reed is observed by means of an optical method. Signals proportional to and in phase with the force and the elongation respectively are obtained and applied to the two pairs of deflecting plates of an oscilloscope. Thus, a picture of the elastic hysteresis loop is obtained. The area of this loop is a measure for the elastic losses in the sample.

Observations were made in a frequency range from 300 to 4000 cps and at temperatures from —60° C. to +35° C. The results can be qualitatively interpreted by a relaxation theory, the relaxation time varying very strongly with temperature and with the styrene content. The crystallization of the samples is accompanied by a strong increase in the losses when the temperature decreases, and then a decrease at still lower temperatures.

The Torsion of a Rubber Cylinder. ***R. S. Rivlin (British Rubber Producers' Research Association).***

In a series of papers pending publication (Rivlin, *Phil. Trans. Roy. Soc. A.*) a mathematical formalism has been developed for the solution of problems concerning the deformation of highly elastic materials.

The present paper is concerned with the experimental verification of the predictions of one paper of this series, in which the torsion of a rubber cylinder is discussed on the basis of this theory and it is found that, in order to produce pure torsion in a rubber cylinder, a compressive longitudinal thrust must be applied over the plane ends of the cylinder, in addition to the torsional couple.

The distribution of this thrust over the ends of the cylinder and its dependence on torsion are investigated experimentally in the present paper and agreement with the theoretical conclusions is obtained.

Heat Conductivity of Natural and Synthetic Rubbers Under Stretch and at Low Temperatures. ***H. D. Smith, T. McC. Dauphinee, and D. G. Ivey (University of British Columbia, Vancouver, British Columbia, Canada).***

Heat conductivity of natural and synthetic rubbers was studied in the range from +50° to —160° C. and from 0 to 100% stretch for two different cures and ages. The apparatus was a greatly modified version of one designed by Schallamach. Both for natural and synthetic rubbers, the value of the heat conductivity measured perpendicular to the direction of stretch was smaller and the rate of change of conductivity larger in the stretched than in the unstretched state. On lowering the temperature and raising it again natural rubber shows very complicated hysteresis phenomena due to progressing or regressing crystallization. Synthetic rubber shows a simpler behavior exhibiting a hysteresis loop due to the transition of second order from elastic to brittle, glassy material.

The hysteresis phenomena for both types of rubber show great similarity (in particular in thermal conductivity near the brittle point) to the drop in specific heat observed by Bekkedahl and associates. The effect of cure and the effect of aging depends on the position of the temperature with regard to the transition temperature. Above and below the transition region, the heat conductivity decreases approximately linearly with temperature as one may expect from theory. Theoretical approaches to heat conductivity of polymers will be discussed briefly. Financial support by the National Research Council of Canada is gratefully acknowledged.

Relaxation of Stress in Plastic Materials. ***M. Mochulsky, R. D. Andrews, and A. V. Tobolsky (Princeton University, Princeton, N. J.).***

Studies of relaxation of stress at constant extension over a wide range of temperatures were extended from rubbery to plastic materials. These studies were interpreted in terms of such variables as molecular weight, cross linkage, chain stiffness, crystallity and interchain interaction. The effect of plasticizer was also investigated. Decay of stress due to chemical scission was observed in at least one linear thermoplastic.

Friday Morning—January 31

Six Rules for Analyzing Stress-Strain Curves. ***George Halsey (Textile Research Institute).***

In the analysis of the stress-strain properties of a material there is a certain advantage to the making of haphazard stress-strain curves following no particular pattern. As more painstaking analyses are attempted and as the model is refined, this procedure becomes very wasteful. The writer has attempted to improve the situation by setting up a series of six rules for the analysis of the stress-strain curves.

In the present paper the general distribution of non-Newtonian relaxation times is included in the scheme of analysis. Also, the existence of multiple equilibrium positions at the same value of the flow coordinate is discussed. The paper is organized into six rules of procedure, each containing a simplifying criterion. If all six criteria are obeyed, then the material under study is representable by a hyperbolic sine-law model. The six rules suggest an orderly mode of experiment.

Studies of Cellulose Acetate with the Ultracentrifuge. *S. Singer and H. Mark (Polytechnic Institute of Brooklyn, Brooklyn, N. Y.).*

Measurements on a series of fractions of cellulose acetate in acetone have been performed with the velocity ultracentrifuge combined with free diffusion experiments. The molecular weights, M, of these fractions varied from 10,000 to 200,000, and in this range the sedimentation constant s varied considerably with M. In a system where s is independent of M, the particles may be considered "free-draining," that is, solvent freely penetrates the molecule. For particles that are impermeable to solvent and are randomly coiled, s is proportional to $M^{1/2}$. Our results indicate that the cellulose acetates are intermediate between these two cases.

Moreover, on the assumption that the molecules may be satisfactorily represented by ellipsoids of revolution, axis ratios are calculated from sedimentation data and viscosity data independently, by Perrin's and Simha's equations respectively. The axis ratios so calculated differ by factors outside of experimental error, and indicate that the model is not a quantitative one for cellulose acetate in acetone.

An Instrument for Measuring Particle Diameters and Constructing Histograms from Electron Micrographs. *E. E. Hanson and J. H. Daniel (Firestone Tire & Rubber Co., Akron, Ohio).*

An instrument for shortening the time and labor required in constructing particle size histograms from electron micrographs is described. Representative histograms obtained with the instrument for GR-S latices are shown. Linear, surface, and volume-equivalent diameters of non-spherical particles are defined, and variations in the instrument for plotting such diameters are proposed.

Saturday Morning—February 1

Some Dielectric Properties of Butadiene-Containing Polymers and Copolymers. *R. F. Boyer, E. B. Baker, and P. C. Woodland (Dow Chemical Co., Midland, Mich.).*

A study of the dielectric properties of mixtures of polystyrene and polybutadiene revealed a peak in the power factor-frequency curve at 100 megacycles. This peak was first ascribed to vinyl side groups, but it was then found that purified, natural rubber also showed a peak of about the same magnitude and at the same frequency.

Consideration was next given to the idea that a long chain of conjugated double bonds is a perfect electrical conductor. It was thought that a regular distribution of double bonds, as along a chain of polyisoprene, might cause dielectric dispersion when the transit time of electrons along the polymer chain was equal to the frequency of the applied field.

Dispersions of carbon black in polyethylene were made to simulate roughly the proposed mechanism of dielectric loss. Such systems showed both a low frequency as well as a high frequency power peak. Both peaks depended in magnitude on the orientation of the carbon black particles with respect to the electric field being smaller when the long axis of the particle was perpendicular to the field.

Dielectric Properties of Rubber—Particularly of Loaded Stock. *L. V. Holroyd, B. A. Mrowca, and Eugene Guth (University of Notre Dame, South Bend, Ind.).*

Dielectric constants and losses were measured in the range from 0-200 M.c. In general, dielectric constants decrease with increasing frequency, with a drop corresponding to the peak in the loss-frequency curve. The peaks observed in the loss-frequency curve at low frequencies may be interpreted as due to oxidation and to fillers, at high frequencies as due to dipoles caused by the bonding of sulfur in vulcanization. Changes of dielectric constants and of losses, in particular shifts in peaks with temperature in the range of 0-70° C., were also studied.

Dielectric constants of rubber-carbon black mixtures from 0 to 25% volume concentration were observed and compared with theory of spherical particles indicated by Guth (*J. App. Phys.*, 1944). An extension of this theory to ellipsoids was also used in the interpretation of the data. Infinite conductivity of carbon black as compared to that of rubber was assumed. Results may be interpreted by assuming that carbon black particles preferentially form doublets. This result on doublets is also indicated in data kindly communicated to us by Dr. Breckenridge in von Hippel's laboratory (M.I.T.). Financial support by ONR, Navy Department, is gratefully acknowledged.

Frequency Response Characteristics of Dielectric Materials and Their Interpretation. *A. von Hippel, H. B. Callen, and W. B. Westphal (Massachusetts Institute of Technology, Cambridge, Mass.).*

The paper presents dielectric constant and loss characteristics of gases, liquids, and solids measured over a broad frequency range and considers their interpretation in terms of molecular physics.

The Electrical Resistivity of Conducting Rubber. *Paul E. Wack (University of Notre Dame, South Bend, Ind.).*

The electrical resistivity of GR-S loaded with Shawinigan and Continental R-40 carbon blacks was determined as a function of temperature, elongation, time and percentage volume loading. The resistivity of GR-S-Shawinigan mixes first increases with elongation and then decreases, the peak occurring between 10 and 20%, but the resistivity of GR-S-R-40 mixes increases for all elongations. The resistivity of all stretched samples decreased exponentially with time. These resistivity-temperature curves exhibited hysteresis loops for samples stretched to low elongations or for samples of low volume loadings, but did not show loops for samples stretched to high elongations or highly loaded. A plot of log-conductivity versus 1/T yielded straight lines.

The temperature coefficient of resistivity for unstretched samples loaded with Shawinigan black is positive for all loadings investigated, and increases with loading. Both Shawinigan and R-40 blacks have a negative temperature coefficient of resistivity. Both positive and negative temperature coefficients were observed for unstretched samples loaded with R-40, the coefficient being negative for low loadings and positive for higher loadings. Log-resistivity versus carbon concentration yielded an exponentially decreasing curve and log-resistivity vs. log-concentration an approximately linear relationship. Interpretation of data will be discussed. Financial support of ONR, Navy Department, is gratefully acknowledged.

Measurements of the Refractive Index of Films. *Fred W. Billmeyer, Jr. (E. I. du Pont de Nemours & Co., Arlington, N. J.).*

The refractive index of a film of transparent or translucent material may be determined by immersing the film in a suitable liquid mixture and observing the intensity of light reflected from the surface of the specimen. The composition of the immersion liquid is varied, and a record is made of its refractive index (measured on a refractometer) and of the reflected light intensity. The refractive index of the film is the same as that of the immersion liquid giving the lowest reflected intensity. This has been confirmed by experiments with a glass plate, whose refractive index was known. According to Fresnel's law of reflection, the experimental data should fit a parabola with its minimum at the refractive index of the film. On fitting the data by the method of least squares, the minimum is obtained with a standard deviation of the order of 0.002 refractive index units. The method has been applied to several plastic materials.

The development of a **packaged unit for boiler water treatment** has been announced by %Proportioneers, Inc.%, 66 Codding St., Providence, R. I. The new unit includes an Adjust-O-Feeder compactly mounted with a motor on the same base with a chemical tank and agitator.

Editorials . . . . . .

Clue to the Situation

DESPITE numerous conferences held in Washington between representatives of the various branches of the rubber industry and government executives, to date no definite formulation for a national policy on rubber has been announced. The future of the synthetic rubber plants is also somewhat hazy, although from time to time, based on the recommendations of the Inter-Agency Policy Committee on Rubber, some of the butadiene or styrene plants, or even one of the copolymer plants, are placed on the block. The question of resumption of free trading is still in doubt, except that it now seems definite that public procurement of natural rubber will be continued for at least the next few months.

Some indication of the Administration's current position on rubber, however, was contained in the recent budget message submitted to Congress by the President. Where rubber is concerned the budget message was predicated on four specific assumptions, namely: (1) The government will continue to own and operate most of the synthetic rubber plants in the United States during the fiscal year (which begins July 1, 1947); (2) the government will produce approximately 500,000 tons of synthetic rubber; (3) the Reconstruction Finance Corporation will not be required to purchase natural rubber; (4) the government will assist in controlling distribution to American consumers.

The budget message contained several other revelations relating to rubber, such as: (1) Of the 51 war-built synthetic rubber plants, the government expects to keep 28 units, costing $406,000,000, in operation during the next fiscal year; (2) Of the remaining plants, the government expects 17 to be declared surplus by July 1, 1947, three to be declared surplus after that date, and three to be kept in stand-by condition; (3) A government stockpile amounting to 235,000 tons will have been acquired during the fiscal year, costing $118,474,000; (4) Total sales of synthetic rubber during the year will amount to $217,772,800, providing no change is made in current sales prices, as compared to $300,653,000 during the current fiscal year; (5) Average sales price for the estimated synthetic rubber to be produced will be 19.13c per pound, resulting in a net profit of 4.93c per pound.

Budget messages covering a forthcoming fiscal year are, of course, based upon a number of assumptions. The stress placed on the rubber situation in this particular message is indicative of the fact that the problem is receiving a good deal of official attention, and furthermore, and much more important to the rubber manufacturing industry, early action is pending. In this connection it should be pointed out that, according to John R. Steelman, assistant to the President, the latter will shortly request a three-point program from Congress, as follows:

(1) A declaration of policy stating that it is the intention of Congress, in the interest of national security, to protect and maintain a minimum synthetic rubber industry in the United States.

(2) The designation of committees of the Senate and the House to investigate the rubber problem and to recommend, at an early date, the enactment of permanent rubber legislation.

(3) A temporary extension of the war powers as applied to rubber, authorizing continued exercise of controls on rubber consumption and inventories pending enactment of permanent legislation.

Although these recommendations have not, at this writing, actually reached Congress, it is known that short-range legislation to set in motion Congressional machinery for dealing with the over-all rubber program is already under consideration. The appointment of a special committee to hold new hearings on the situation, with a view to establishing long-range legislation by July 1, is expected momentarily. The special committee will probably consist of members of both the House and Senate, so that definite action can be expedited. This will represent the final opportunity for industry to make its views clear.

CURRENT NEWS OF THE MONTH

RUBBER PROCUREMENT REMAINS IN HANDS OF THE GOVERNMENT

Although a series of meetings was held between government officials and trade representatives in Washington during the latter part of December, and although no official announcement was made as a result of those meetings, it seems evident at this writing (January 9) that the procurement of natural rubber will remain the function of the government for the time being. The only clue to the situation was furnished in the report submitted by the Civilian Production Administration to the President, dated December 6, 1946, but released on December 25. The following statement was contained in that report:

"Resumption of free market conditions in the Far East and reopening of the rubber futures market in London have been announced. At the request of OWMR, exclusive public purchase of natural rubber will continue in the United States beyond January 1, 1947, and the question of permitting private imports (into the United States) will be reviewed following reports from the International Rubber Study Group meeting, held at The Hague in November, 1946."

The CPA report also indicated that forward supply estimates for natural rubber make it appear that specification and allocation controls "of some type" will be necessary during 1947, that while usage controls will be necessary during the year, natural, synthetic and reclaimed rubber should be removed from the critical products list which has entitled them to priority assistance, and that the forecast for 1947 indicates a continuation of current high levels of rubber consumption during the first half of the year with a drop-off in the second half, resulting in an annual total of about 1,003,000 long tons.

As far as can be determined at the moment, continuation of public purchase of natural rubber will probably be continued until such time as Congress legislates an extension of present usage controls over rubber consumption. These controls are covered by the Second War Powers Act which expires on March 31. Legislation might possibly consist of a simple extension of this Act covering rubber and a few other scarce materials.

Trade Association Disagrees

In a special statement reviewing the natural rubber situation, issued on January 6, the Rubber Trade Association of New York disagreed with the decision to continue public purchase of natural rubber. The Association contended that the argument that return of free trading would result in prices skyrocketing is unsound "since end-use control would avoid this situation." It also pointed out that if end-use controls are not extended beyond March 31, which it termed highly improbable, government purchase and ownership would not help the situation at all "since the government would have no power to allocate or purchase beyond the Army - Navy stockpile requirements."

"When rubber is returned to private purchase," the statement claimed, "the continued present production of synthetic should act as a brake on any possible temporary increase in the price of crude, since too large a premium of crude over synthetic would tend to discourage crude consumption." Furthermore, the Association pointed out, if end-use controls are continued, consumption is automatically regulated to supply.

Bulk purchasing by a government cannot succeed in an open market, according to R.T.A., it can only succeed if the governments of the producing countries act as bulk sellers. In the opinion of the Association, the continuation of attempted government purchasing will work against the security objective which is all important and which is constantly stressed. The Association views the method of purchasing rubber and the control of the use of rubber as two separate and distinct problems "and that the necessity for their connection has been overemphasized."

Legislation Pending

According to a report from Washington, short-range legislation to set in motion Congressional machinery for dealing with problems of synthetic rubber and continued Government controls is now under consideration. If enacted, the legislation would authorize a joint Congressional investigation to determine how large a synthetic rubber industry is to be maintained and the means by which such maintenance can best be achieved. The investigation, in turn, would be expected to result in specific recommendations for a national rubber policy and long-range legislation.

Producing Rubber Toys

Topstone Rubber Toys Co., Inc., was recently organized at Topstone Road, Ridgefield, Conn., for the manufacture of rubber toys. Fred Hagemann is president and David Schenning is vice-president of the concern.

LATEST RUBBER ORDER CHANGE RELAXES CONSUMPTION RULES

Under the terms of Rubber Order R-1, as amended December 31, 1946, rubber manufacturers are no longer required to obtain permission to consume natural rubber, Butyl and GR-S, and thus are free to determine what permitted products they will make from the quantities of these materials they obtain. Authority to "accept delivery" of rubber, however, must still be obtained from the Civilian Production Administration, now a part of the Office of Temporary Controls.

In announcing the change, CPA emphasized the point that manufacturers still may produce only rubber products which are specifically permitted by the rubber regulation and must still observe the specifications listed in that regulation. Manufacturers are still required to obtain authorization both to accept delivery and to consume natural rubber latex, which remains in extremely short supply.

Three other important changes were made in the amended order: (1) The maximum inventory of any type of synthetic rubber, including synthetic latices, is now 45 days at the current production rate; (2) The use of natural rubber is now permitted in cup caps and inflations for milking machines; (3) The use of 30% of natural rubber is permitted in the manufacture of building wire.

Release Tire-Type Rayon Cord

Previously, CPA issued Amendment No. 1 to Rubber Order R-1, as amended November 29, 1946. This amendment released the use of tire-type high-tenacity rayon cord, fabric or yarn for any purpose desired by the rubber manufacturer. Heretofore such material was limited to certain specific uses. Specifically, the amendment deleted List No. 15. from Appendix II of the rubber order.

Under the previous regulation, Appendix II of the rubber order required that high-tenacity rayon cord, fabric or yarn be consumed according to a preference pattern in such items as airplane tires, self-sealing fuel cells, military combat tires, special purpose and truck and bus tires, etc. Use of rayon tire cord was not permitted in the popular 6:00 inch cross section and smaller passenger car tires.

Government tests are reported to have indicated that cotton tire cord is satisfactory in the smaller passenger car tires. However, under the amendment referred to above, manufacturers may now offer a passenger car tire with rayon tire cord, providing they can secure enough of that material.

RUBBER EXECUTIVES PREDICT CONTINUED DEMAND FOR PRODUCTS IN 1947

Year-end statements issued by executives of the large rubber companies indicate that through most of 1947 the rubber industry will still be producing at top speed to meet the yet unsatisfied demand for tires and other products. Barring unpredictable disturbances, such as material shortages and work stoppages, the supply of passenger car tires is generally expected to be in a fair state of balance with demand during the latter part of 1947.

According to John L. Collyer, president of the B. F. Goodrich Co., the total production of tires in 1947 should be about the same as for 1946, approximately 87,000,000 units. Of the expected 1947 total, probably 70,000,000 to 72,000,000 units will be passenger car tires and about 12,000,000 truck and bus tires, whereas the 1946 totals were about 66,700,000 passenger car tires and 15,500,000 units for trucks and buses. The remainder of the 87,000,000 unit total is accounted for by farm service, airplane, pneumatic, industrial, and motorcycle tires.

Status of Rubber Supply

Mr. Collyer pointed out that best available statistics indicate that there will be no surplus of natural rubber at least through the coming year. Rubber officials of the world's leading rubber-producing countries estimate world consumption of rubber in 1947 at 1,700,000 tons, whereas total production of natural rubber is expected to be only 1,200,000 tons. Synthetic rubber should make up the difference. However, he noted that as the supply of natural rubber becomes more able, in the late months of 1947 and subsequently, to satisfy America's rubber tonnage requirements, the need for maintaining the nation's facilities for production of synthetic rubber will become less obvious.

Because of this, the Goodrich executive, in keeping with the position he took as early as eighteen months before Pearl Harbor of calling attention to the importance of synthetic rubber to national security, strongly urged prompt and decisive action at the law making level. The nation must make sure, he said, that there are certain minimums of both production and use of synthetic rubber, regardless of strictly economic factors, even after the supply of natural rubber becomes almost completely sufficient to meet normal demands.

In addition to the national security need, maintenance of synthetic rubber producing facilities even at modest levels of output was recommended by Mr. Collyer to lessen the hazard of high rubber prices resulting from cartels, which in the past have been reflected in the cost to American users of tires and other products, and have caused rubber price skyrocketings that reached $1.23 per pound as recently as 1925.

Buyer Resistance Noted

Pointing out that production of peacetime goods in 1946 was at a high over-all total volume but far from uniform or balanced, P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., noted that sharp increases in production costs and sales have occurred in recent months and there are now strong indications of buyer resistance. Although the past year saw considerable progress toward untangling the national economy from its war-time controls and impediments, much still remains to be done in this direction.

By reason of an unusual combination of circumstances, tire prices were held at reasonable levels as compared with 1941, according to Mr. Litchfield, and an outstanding job of production was accomplished by the tire industry. In the face of threatened material shortages and disrupting strikes among suppliers of materials and services, the total output of the tire industry in United States in 1946 amounted to more than two new tires for every passenger car on the road. Even so, the tire demand remains in excess of supply and will continue in this condition for a part of 1947.

Overshadowing all normal economic considerations bearing upon general business prospects for 1947 is the unsettled state of relations between employers and employees in the mass industries. Unless the trend toward higher production costs is speedily reversed and unless the threat of major strikes is removed, the prospects which otherwise seemed to be offered by 1947 will fall short of realization, in Mr. Litchfield's opinion.

Emphasizes Free Enterprise

Harvey S. Firestone, Jr., president of the Firestone Tire & Rubber Co., placed emphasis on the substantial advances made in 1946 toward the restoration of free enterprise as the basic principle of American business. He praised industry as a whole in the United States for already reaching and surpassing the post-war goals of even the most optimistic economists. As far as the rubber industry is concerned, Mr. Firestone stated that unless unforeseen circumstances occur, it is reasonable to expect that by the spring of 1947 car owners will be able to get the tires they want when they want them.

Referring to the fact that a year ago pessimists were predicting that the cancellation of war contracts and the rapid demobilization of the armed forces would result in 10 000,000 unemployed and a widespread depression in 1946, Mr. Firestone pointed out that national income payments to individuals are now at the all-time high rate of $167,000,000,000 a year and that 57,000,000 people are employed, which is 8,000,000 more than in any other peacetime year. As a matter of fact, he added, we have already reached and passed the post-war goals of even the most optimistic economists.

No "Recession" Danger

J. P. Seiberling, president of the Seiberling Rubber Co., predicted that the rubber industry will continue to operate at a very high rate of production for at least a period of two years and that it will virtually be immune to the immediate effects of any "recession" which may come during 1947 or even 1948. If the rubber industry is permitted to operate at full production during 1947, he declared, it will be able to supply the demand for tires by the year's end.

By late 1947, however, the rubber industry will have to begin the job of rebuilding inventories that have been depleted over a period of nearly seven years. Manufacturers, jobbers, and dealers must rebuild their stocks to provide a normal backlog.

Most tire manufacturers were said to be refraining from producing any but the standard quality tire now, because it has been found that the nation's needs can be filled more quickly by concentrating on the manufacture of this one grade, which is suitable for most purposes. But Mr. Seiberling felt sure that most tire manufacturers will introduce a premium tire by late in 1947, when the demand is nearly fulfilled.

Status of the Plastics Field

In a year-end review of the plastics industry, W. Stuart Landes, president of the Plastics Materials Manufacturers Association, reported that with demand three times the supply, current production of plastics is about double that of 1941. Although shortages of basic chemicals and therefore of plastics materials have harassed the manufacturers, molders, and fabricators since V-J Day, and will continue to be one of the major problems, Mr. Landes anticipated that prices will constitute the foremost problem in 1947, as they will with business in general, because of the danger of overpricing and the possibility of setting the stage for a recession.

Planned expansions in capacity for basic chemicals and plastics that were expected to be completed in 1947 will now run well into 1948 or later, Mr. Landes indicated. Some previously announced projects have been shelved because of the lack of government approval, inability to obtain building materials or equipment, lack of assurance of adequate supplies of raw materials, insufficient financing due to rising costs, or increased caution on the part of management in the face of all of today's uncertainties.

REPORT ON 1945 ACTIVITIES RELEASED BY RUBBER RESERVE

A report on the government synthetic rubber program for the year 1945, together with certain related activities in natural rubber for the same year, was recently issued by the Office of Rubber Reserve, Reconstruction Finance Corporation.

Production in 1945 of synthetic rubber in the government-owned program amounted to 801,888 long tons. In addition, plants owned by private industry produced 18,903 long tons. The total production, 820,791 long tons, represents the world's greatest annual output of man-made rubber. Before the production cutbacks made as a result of V-J day, an annual production rate in excess of 1,000,000 long tons had been attained.

In 1944 government production totaled 737,131 long tons and in 1943, 208,612 long tons. In the first half of 1945, rubber reserved diverted certain of its feedstocks to the aviation gasoline program and also produced high octane gasoline blending agents through August, at which time demand for these materials ceased.

For comparative purposes, the report includes figures on German rubber operations. These show a maximum production of 109,173 metric tons (approximately equivalent to long tons) which was attained in 1943. In the last half of 1944 only 34,000 metric tons were produced, the decline being the result of strategic bombing.

Costs of synthetic rubber production, excluding amortization of plant costs, are shown for the three principal types of synthetics being produced. Costs of GR-S, a general purpose synthetic rubber which accounts for almost 90 percent of the total tonnage, dropped substantially during the year as a result of cutbacks in components made from high-cost alcohol feedstocks.

At the end of the year this rubber was being produced at an out-of-pocket cost of about 16 cents per pound. Costs of GR-M, a synthetic having particular oil and chemical resistant properties, were brought down to approximately 19 cents per pound at one period but increased as a result of the lower production required after V-J day. Costs of GR-I, a synthetic particularly applicable to the manufacture of inner tubes and other materials requiring special air retention properties, fluctuated during the year but averaged 16.3 cents per pound.

Approximately $3,600,000 was spent during 1945 for research and development projects in the rubber field. Results were made available to all parties participating in the technical information exchange agreements sponsored by Rubber Reserve. Contributions made during the year led to continued improvement of synthetic rubber and to increased plant efficiencies.

Plant employment which had stood at approximately 22,000 prior to V-J day was reduced to slightly below 18,000 by the end of the year, entirely due to curtailed production schedules resulting from the lowered over-all rubber needs as predicted by the responsible government agencies.

Natural rubber imports during 1945 totaled 135,672 long tons, obtained by the Rubber Development Corp. which had been set up by the RFC to procure rubber from sources available during the war and to encourage the development of natural rubber in foreign areas accessible to the Allied powers.

Coming Events

Jan. 30. Northern California Rubber Group, Oakland, Calif.

Feb. 1. Akron Rubber Group, Hotel Mayflower, Akron, Ohio.

Feb. 14. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Feb. 14. Connecticut Rubber Group.

Feb. 20. Southern Ohio Rubber Group, 24 West 4th St., Dayton, Ohio.

Feb. 24-28. A.S.T.M., Spring Meeting and Committee Week, Hotel Benjamin Franklin, Philadelphia, Pa.

Mar. 17-19. N.A.W.M.D. Hotel Sherman, Chicago, Ill.

Apr. 14-18. A.C.S., 111th Meeting, Atlantic City, N. J.

May 9. Akron Rubber Group, Hotel Mayflower, Akron, Ohio.

May 9. Connecticut Rubber Group.

May 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Cleveland, Cleveland, Ohio.

June 16-20. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Sept. 15-19. A.C.S., 112th Meeting, New York City.

Reichhold Acquires New Sites

Reichhold Chemicals, Inc., has announced the acquisition of four new sites, including 680 acres at Tuscaloosa, Ala., 21 acres at Elizabeth, N. J., and 5 acres at South San Francisco, Calif., in all of which cities Reichhold plants are now operating, and 110 acres at Philadelphia, Penna. The company plans to utilize the new sites for the construction of additional plants devoted to the production of synthetic resins, chemical colors, and phenolic plastics, as well as the development of new chemicals.

October Rubber Consumption

Consumption of rubber in the United States for the month of October, 1946, amounted to 96,370 long tons, according to the Rubber Manufacturers Association. Of the total consumed, 61,011 tons were synthetic rubber and 35,359 tons natural rubber. Breakdown of the synthetic rubber was as follows: GR-S, 49,225 tons; Butyl, 6,524; neoprene 4,650; nitrile rubber, 612. A total of 26,162 tons of reclaimed rubber was consumed in the same month.

FUTURE POSITION OF COTTON DISCUSSED AT AKRON MEETING

The future competitive position of cotton in the manufacture of tire cord was discussed at a conference held at the Research Laboratory of the Goodyear Tire & Rubber Co. in Akron on November 25, and attended by a group of cotton research experts and technical representatives of nine of the major tire manufacturing concerns. The conference was called at the request of the Goodyear research staff, following a preliminary meeting in Akron on November 7 with representatives of the National Cotton Council.

At the conference, Proctor W. Gull, assistant superintendent of the Mississippi State Experimental Station, presented a talk, which covered the following subjects: methods used in producing cotton; the problems which have to be faced; methods currently in use for combating the difficulties encountered in cotton farming; new machinery which has been successfully developed and tested, and machinery which is in development stages for increasing the mechanization of cotton. He also discussed the savings in man hours which could be effected using the new machinery and the increase in acreage which could be cared for by one man or by one family.

Dr. Frank Welch, Dean of the College of Agriculture of Mississippi State College and head of the Department of Agricultural Economics, then expanded on Mr. Gull's statements by describing some of the efforts being made in the Department of Agriculture, in the South, and in the National Cotton Council to analyze the problems confronting the cotton industry and to get effective work done to solve them. He also gave some estimates of what future cotton costs might be.

After Dr. Welch's talk, a motion picture was shown of a newly developed flame cultivator, which can be used for chopping and for killing weeds, and which, in conjunction with the mechanical cotton picker, is reported to reduce greatly the amount of labor required for cotton farming.

The cotton research experts pointed out that by complete mechanization the number of man hours required to cultivate one acre of cotton in the Delta area could be reduced from approximately 130 man hours as required at the present stage of mechanization to about 16 with full mechanization efficiently applied, thus lowering the production cost of cotton.

Price reductions ranging from 50 to 70% for Kriston thermosetting resins have been announced by Goodrich Chemical. Concurrent with the announcement of the price reduction was the start of operations at the new integrated pilot plant in the company's experimental station at Avon Lake, Ohio.

WILSON, SELHEIMER AND KVET HEAD DETROIT RUBBER GROUP

J. P. Wilson, of the Ford Motor Co., and C. W. Selheimer, of the U. S. Rubber Co., were elected chairman and vice-chairman, respectively, of the Detroit Rubber & Plastics Group, Inc., at a combined Christmas Party and Meeting, jointly sponsored by the Detroit group and the Society of Plastics Engineers and held at the Detroit-Leland Hotel in Detroit, Mich., on December 13. E. J. Kvet (Baldwin Rubber) was re-elected secretary-treasurer of the group.

In addition to the officers, various committee chairmen were named at the meeting, as follows: *Educational,* Fred Wehmer (Minnesota Mining) and J. C. Dudley (Chrysler); *Membership,* Fred Haushalter (Firestone); *Program,* William Davies (Kaiser-Frazer); *Entertainment,* Tom Halloran (Chemical Products) and George Horsful (American Cyanamid); *Publicity,* George Wolf (Sharples Chemicals). The following were named as members of the Advisory Board: W. G. Nelson (U. S. Rubber), J. R. Shroyer (R. T. Vanderbilt), and J. C. Dudley (Chrysler).

The featured speaker at the meeting, attended by approximately 300 members and guests of both groups, was Dr. H. N. Stevens, research coordinator of the B. F. Goodrich Co., Akron, who spoke on "The Bikini Atom Bomb Tests." The lecture was accompanied by vivid pictures of the results of these tests.

The meeting also featured musical and magical acts, a simulated radio quiz, and the distribution of a large number of prizes, the latter having been made possible by donations from the following concerns:

Auburn Rubber Co., Baldwin Rubber Co., Barrett, Binney & Smith Co., Godfrey L. Cabot, Inc., Caldwell Co., Carter Bell Mfg. Co., Central Rubber & Steel Corp., Continental Carbon Co., Dow Chemical Co., E. I. du Pont de Nemours & Co., Durez Plastics & Chemicals, Inc., Firestone Industrial Products Co., Flintkote Co., Givaudan-Delawanna, Inc., B. F. Goodrich Chemical Co., Harwick Standard Chemical Co., Hercules Powder Co., Herron Bros. & Meyer, J. M. Huber, Inc., *India Rubber World,* Industrial Rubber Goods Co., Midwest Rubber Reclaiming Co., Minnesota Mining & Mfg. Co.

Also Monsanto Chemical Co., J. W. Montell, Moore & Munger, H. Muehlstein & Co., F. F. Myers Co., New Jersey Zinc Sales Co., Pequanoc Rubber Co., Phillips Petroleum Co., Piqua Stone Products Co., Recto Molded Products Co., Rohm & Haas Co., RUBBER AGE, A. Schulman, Inc., Schwab & Frank, Inc., Sharples Chemicals, Inc., Stamford Rubber Supply Co., Stanco Distributors, Inc., Standard Oil Co. (Indiana), Tanney & Costello, Thiokol Corp., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., C. K. Williams & Co., Witco Chemical Co., Xylos Rubber Co., Yale Rubber Co.

Salvaged Rubber

During the war period import entries were filed with the Bureau of Foreign and Domestic Commerce covering crude rubber salvaged from the high seas. The entries covered both rubber salvaged on United States shores and that on foreign shores subsequently shipped to the United States. Obviously, the country of origin cannot be determined for such salvaged rubber and data on these "imports" are not included in the regular rubber inport figures published regularly. According to the latest figures issued, however, a total of 650,708 pounds, with an estimated value of $109,566, was salvaged from the high seas during the calendar year of 1945.

HICKERNELL AND RADOW HEAD SOUTHERN OHIO RUBBER GROUP

In the first annual election of officers of the recently organized Southern Ohio Rubber Group, which was conducted by letter-ballot, Roger R. Hickernell, of the Inland Manufacturing Division, General Motors Corp., Dayton, Ohio, and Robert S. Radow, of the Dayton Rubber Manufacturing Co., Dayton, Ohio, were elected chairman and vice-chairman, respectively, for 1947. Louis J. Keyes (Dayton Rubber) was elected treasurer, while Russell J. Hoskin (Inland Mfg.) was appointed secretary.

The following members were named directors of the Group: *Three-Year Terms*—Joseph Rockoff (Dayton Rubber), Herman E. Wening (Inland Mfg.), and Edward C. Dill (Inland Mfg.); *Two-Year Terms:* R. B. Appleby (Du Pont), S. L. Brams (Dayton Chemical Products), and H. W. Bell (Firestone Industrial Products); *One-Year Terms:* R. G. Seaman (*India Rubber World*), M. E. Lerner (RUBBER AGE), and J. L. Fitzgerald (Premier Rubber). The directors are expected to act as a committee for establishing the by-laws of the Group. Paid membership at year's end was announced at 132.

The next meeting of the Group is scheduled to be held on Thursday evening, February 20, at the Young Women's League, 24 West Fourth St., Dayton, Ohio. No speakers for the meeting have been announced at this writing, but an interesting program is promised.

Industrial hose making capacity of Goodyear is reported to be virtually double that of the last prewar year.

A new bulletin, which describes the company's Electrofluid Drive Packaged Power Unit, has been made available by the Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.

QUEBEC RUBBER GROUP HOLDS TWO INTERESTING MEETINGS

The Quebec Rubber & Plastics Group has held two interesting meetings since our last report. Each meeting, attended by approximately 50 members and guests, was held at the Ritz-Carlton Hotel in Montreal, Canada, the first being held on November 10 and the second on December 12. The principal speaker at the meeting on November 10 was Dr. R. V. V. Nicholls, assistant professor of chemistry at McGill University, who spoke on "Synthetic Rubber, Plastics, and Fibres," while Lt. Col. K. R. Swinton, manager of the Electronics Apparatus Division of the R. C. A. Victor Co. of Canada, Ltd., discussed "Electronics in Industry and the Home" at the metting of December 12.

In his talk, Dr. Nicholls outlined in terms understandable to the layman the basic structural differences which explain the mechanical properties of synthetic rubbers, plastics, and fibres. He emphasized the continuity of structural form which exists throughout these three arbitrary classifications. The importance of double bonds, chain length, cross linking and substituent groups in controlling the properties of synthetics was explained thoroughly.

After briefly reviewing the history of the development of electronics from the first theoretical predictions of Maxwell up to the present time, Col. Swinton, in his talk, outlined the manifold applications of electronics during World War II and the postwar period. During the war, electronics found application in buzz-bombs, radar, proximity fuses, guides to naval and air navigation, walkie-talkie, and in all the complex communication systems.

The peacetime applications were described as equally diverse. Cited as indicative of this diversity were the use of radio, teletype, the introduction of frequency modulation in radio, and the perfection of television. Industry is finding more and more uses for electronics in control work, sorting, and counting, Col. Swinton said. In the plastics molding field, the radio frequency heating of preforms has resulted in a large increase in output. The electron microscope has contributed significantly in determining the structure of matter, while the use of radio aids to navigation has made the guidance of aircraft practically independent of weather conditions.

To Feature Rubber Exhibits

Rubber and sporting goods exhibits will be featured in the World's Industrial Fair, which is scheduled to open in Atlantic City, N. J., next June. Principal exhibit building of the Fair will be the Million Dollar Pier, extending more than a third of a mile out over the Atlantic Ocean. The Fair, modeled after the permanent fair at Leipzig, Germany, is expected to become a permanent preview center for innovations in the industrial field.

SAFETY AND FIRE CONFERENCE IS HELD BY RUBBER RESERVE

Approximately 120 plant managers and superintendents, as well as safety directors and engineers of companies operating government-owned facilities for the manufacture of synthetic rubber, attended a three-day Safety and Fire Conference recently held in Washington, D. C., under the auspices of the Office of Rubber Reserve, R.F.C. A number of technical papers were presented during the conference, which also featured numerous group discussions. A display of safety devices was also a feature of the conference.

At one of the sessions held the following papers were presented: *Safety and Production,* by W. R. Hucks, of the Office of Rubber Reserve; *Relation of Safety to Economics of Insurance,* by H. Walter Johnson, of the Sun Oil Co., and *Past, Present and Future,* by Edward S. Webb, of the National Safety Council. In conjunction with the latter address, Mr. Webb presented a plaque and a pennant from the N.S.C. to the National Synthetic Rubber Corp. in recognition of 1,515,000 man-hours of work without an injury. B. J. Oakes, vice-president, accepted the awards for his company.

Eye Protection Symposium

A symposium on "Eye Protection" was the feature of another of the sessions held. Papers presented in the symposium included the following: *Eye Protection,* by A. P. Alleman, of the Humble Oil & Refining Co.; *Chemical Goggles Save Eyes,* by L. A. Webber, of the Phillips Petroleum Co.; *Safety Department Report on Eye Protection Program,* by E. E. Edmondson, Jr., of the Neches Butane Products Co.; and *Prevention of Eye Injuries,* by L. E. Hall, of Sinclair Rubber, Inc.

Additional papers delivered during the three-day conference were: *Organizing for Equipment Inspection,* by A. P. Dunlap, of the Carbide & Carbon Chemicals Corp.; *Safety in Fire Control,* by E. E. Taylor, of the Southern California Gas Co.; *Reduction of Accidents through Removal of Unsafe Practices,* by J. F. Agas, of the Michigan Bell Telephone Co., and *Preventive Industrial Medicine,* by Dr. S. L. Rankin, of the DuPont organization.

The group discussions were divided into three sections, i.e., the copolymer group, the hydrocarbon and chemicals group, and the fire chief group. Discussions centered about specific questions submitted by various cooperating companies.

During the three-day conference, a testimonial dinner was given to A. B. Pettit, who has retired as manager of the safety section of the Office of Rubber Reserve. He was presented with a valuable ring, and received many expressions of appreciation for his work in leading the synthetic rubber safety program practically from its inception.

X.F.L. Impregnating Paper

Developed primarily for use with the new contact pressure resins, the field of application of X.F.L. paper, a product of the Hummel-Ross Fibre Corp., Hopewell, Va., is reported to have broadened to its use as a strong, tough base for artificial leather and as a filler for post forming laminates. X.F.L. paper is a light colored, very light weight, soft, flexible and highly absorbent Kraft paper that is readily penetrated by the most dense resins. These characteristics contribute to its use as a base for artificial leathers utilizing synthetic latex. They also lend support to its use as a backing medium for unsupported polyvinyl chloride films. X.F.L. paper is furnished in rolls or sheets and in calipers ranging from .020 to .070, inclusive. The basic weight is approximately 1½ pounds per point of caliper per 1,000 square feet.

A.S.C. and A.I.C. to Merge

The board of directors of the American Chemical Society and the top officials of the American Institute of Chemists have approved the consolidation of the activities of the two organizations on or about May 1, 1947. Under the plan, which must still be ratified by balloting of the Institute's more than 2,000 members, the A.I.C. will assume divisional status in the A.C.S., the larger and older group. Officers for the new division are expected to be elected at the annual Spring Meeting of the A.C.S., which is scheduled to be held in Atlantic City, N. J., during the week of April 14. The new division will be known as "The Institute of the American Chemical Society."

Industrial V-belts have been added to the mechanical goods line of the Quaker Rubber Corp., Philadelphia 24, Penna.

Hold Synthetic Rubber Symposium

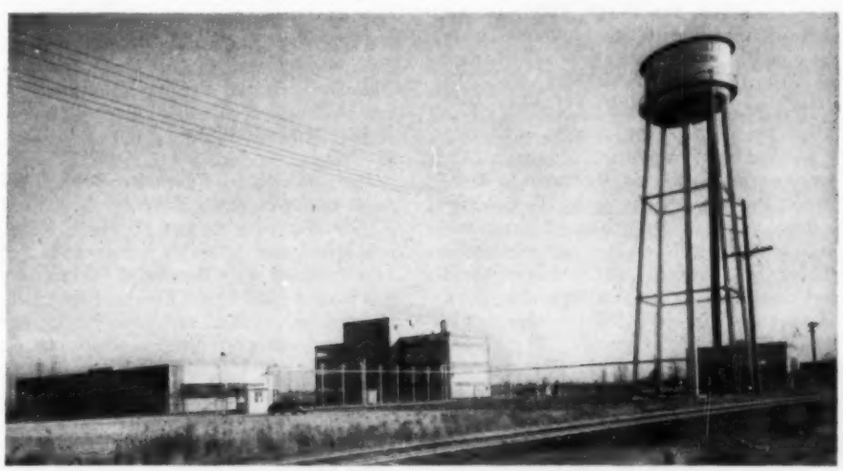
A symposium on synthetic rubber was sponsored by the Institute of Polymer Research at the Polytechnic Institute of Brooklyn, in Brooklyn, N. Y., on December 28. The program highlighted discussions on present developments to improve the strength and durability of synthetic rubbers, and featured the following papers: *The Copolymerization Equation,* by Dr. F. M. Lewis (U. S. Rubber); *Influence of Monomer Structure on Reactivity,* by Dr. C. C. Price (Notre Dame University) and Dr. Turner Alfrey (Polytechnic Institute of Brooklyn); and *Studies on Some Special Copolymerization Systems,* Dr. Cheves Walling (U. S. Rubber).

Geon 500 Series Polyblends

The Geon 500 series polyblends, colloidal blends of polyvinyl resins and nitrile rubber polymers, has been introduced by the B.F. Goodrich Chemical Co., Rose Building, Cleveland, Ohio. These polyblends are said to be unique in that the valuable characteristics of vinyl elastomers are achieved with little or no liquid plasticizer. Geon Polyblend 500 x 329, which is now being produced experimentally, is especially designed for extruding, calendering, embossing and press-polishing operations. A technical bulletin on the new series is available from the company on request.

Gates To Build Laboratory

Gates Rubber Co., Denver, Colo., has been granted a $267,000 building permit by the Denver Building Department for the construction of a research building. The company plans to use the building for chemical engineering and research.



View of the new experimental station of the B. F. Goodrich Chemical Co. at Avon Lake, Ohio, which was recently completed and is now in operation. In addition to a modern development laboratory, this new facility contains a semi-work plant where sufficient quantities of material can be produced to determine large scale cost, purity and elimination of difficulties encountered in commercial production.

TECHNICAL REPORTS AVAILABLE FROM THE DEPARTMENT OF COMMERCE

Listed below is information on additional reports of industrial and technical developments which occurred throughout the world during the wartime period. This information is taken from the "Bibliography of Scientific and Industrial Reports" issued by the U. S. Department of Commerce, and copies of the reports listed may be secured, at the prices indicated, from the Office of Technical Services, Department of Commerce, Washington 25, D. C. Remittances made payable to the Treasurer of the United States must accompany money orders. Titles of the more recent reports follow:

The Synthesis of Acrylamides and the Mixed Polymerization of Acrylamides and Butadiene. By Sherlock Swann and N. M. Elias. Similar to Report No. PB 904, with the exception of added tables and graphs.—Report No. PB 27538. 21 pp. Photostat, $2; Microfilm, $1.

The Impact Resistance of Natural and Synthetic Rubber. In German. Work done by I. G. Farbenindustrie. Enlargement print of part of Microfilm 185-3.—Report No. PB 19321. Photostat, $2; Microfilm, 50c.

Perduren H. In German. Describes the production of Perduren H rubber mixtures of various properties at I. G. Farbenindustrie. Enlargement print of part of Microfilm 180-2.—Report No. PB 17350. 22 pp. Photostat, $2; Microfilm, 50c.

Method for the Drying of Artificial Rubber. In German. Hot air and high frequency drying of artificial rubber at I. G. Farbenindustrie are compared. Enlargement print of part of Microfilm 185-1—Report No. PB 19317. 5 pp. Photostat, $1; Microfilm, 50c.

Method of Treatment of Aqueous Dispersions of Synthetic Rubber. Patent application by I. G. Farbenindustrie for a method of treatment of aqueous dispersions formed by the emulsion polymerization of butadiene hydrocarbons alone or mixed with other polymerizable substances. Enlargement print of part of Microfilm 185-3.—Report No. PB 19342. 6 pp. Photostat, $1; Microfilm, 50c.

Method of Coagulating Aqueous Dispersions of Synthetic Rubber. In German. Patent application by I. G. Farbenindustrie for a method of coagulating aqueous dispersions of synthetic rubber by treatment with carbonic acid and ionizable salts. Enlargement print of part of Microfilm 185-1.—Report No. PB 19353. 4 pp. Photostat, $1; Microfilm, 50c.

Method for the Production of Rubber-Like Polymers. In German. Patent application by I.G. Farbenindustrie for use of small amounts of acrylonitrile or methacrylonitrile to shorten the time of polymerization of mixtures of butadiene. Enlargement print of part of Microfilm 185-3.—Report No. PB 19316. 4 pp. Photostat, $1; Microfilm. 50c.

Depolarization in Diluted Solutions. By P. P. Debye and E. S. Elyash. This report discusses the method for determining the constant β in a formula expressing the scattered intensity of light in solutions which was developed by P. P. Debye in a previous report (PB 9678).—Report No. PB 9679. 13 pp. Photostat, $1; Microfilm, 50c.

Light Scattering in Solutions. By P. P. Debye. Some conclusions which can be drawn from the results of the measurement of light in solutions are covered in this report. It was also published in the *Journal of Applied Physics,* Vol. 15, April, 1944, pp. 338-342.—Report No. PB 9673. 17 pp. Photostat, $2; Microfilm, 50c.

Scattering of Light in Solutions. By P. P. Debye. This report deals with observations of the intensity of scattering of light in solutions as a method for determining molecular weights.—Report No. 9678. 16 pp. Photostat, $2; Microfilm, 50c.

Depolarization Due to Secondary Scattering. By U. P. Strauss. A model formula for a rectangular beam in a dilute solution is developed in this paper.—Report No. PB 9684. 4 pp. Photostat, $1; Microfilm, 50c.

The Status of Synthetic Rubber Research and Polymer Evaluation. By C. S. Marvel. The report covers a survey of recent research studies on synthetic rubber in Germany and reflects the opinions of German scientists looking toward improvement of synthetic rubbers.—Report No. PB 11193. 47 pp. Photostat, $4; Microfilm, 50c.

Use of Synthetic Fibers in Rubber Tires at Continental Gummiwerke, Hanover. By J. B. Quig and others.—Report No. PB 13723. 4 pp. Photostat, $1; Microfilm, 50c.

Evaluation Report on Suit, Diving, Shallow Water, Self-Contained, with Swim Fins, Italian. By W. J. Matteson. —Report No. PB 15593. 4 pp. Photostat, $1; Microfilm, 50c.

Report of Tests on Captured Enemy Equipment Consisting of Three Weather Balloons. By the Rubber Laboratory of the U. S. Navy Yard at Mare Island.—Report No. PB 12619. 3 pp. Photostat, $1; Microfilm, 50c.

Development of Synthetic Rubber Cement and Adhesive Fabric for Gas Mask Repair Kit. By Robert H. Helle. Two neoprene cements and a neoprene-coated fabric, which were developed for use in a gas mask repair kit on natural rubber, reclaimed rubber and neoprene stocks, are described.—Report No. PB 7946. 68 pp. Photostat, $5; Microfilm, $1.

The Determination of Particle Weights or Molecular Weights by Means of Combined Ultramicroscopic and Absorption Measurements in Cases Where the Total Concentration of the Light Scattering Substance is Unknown. By W. Heller. This report is from the University of Chicago.—Report No. PB 9689. 7 pp. Photostat, $1; Microfilm, 50c.

Method of Preparing a Plastic, Easily Manufactured, Synthetic Rubber. In German Patent application by I. G. Farbenindustrie. Enlargement print of part of Microfilm 185-1.—Report No. PB 19352. 5 pp. Photostat, $1; Microfilm, 50c.

Method of Preparing Vulcanization Accelerators. In German. Patent application by I. G. Farbenindustrie for the preparation of an acceleration by the reaction between a thiocarbonic acid polysulfide and a secondary aliphatic, araliphatic, or cycloaliphatic amine. Enlargement print of part of Microfilm 185-1.—Report No. PB 19350. 6 pp. Photostat, $1; Microfilm 50c.

Method for the Preparation of Vulcanizable Mixtures from Organic Film Forming Materials. In German. Patent application by I. G. Farbenindustrie for a vulcanizable rubber containing a polymer prepared by the polymerization of butadiene in the presence of inorganic halides. Enlargement print of part of Microfilm 185-1.—Report No. PB 19346. 3 pp. Photostat, $1; Microfilm, 50c.

Vulkacit J, the New Accelerator for the Production of Safe Mixtures. In German. Description of the accelerator produced by I. G. Farbenindustrie. Enlargement print of part of Microfilm 185-2.—Report No. PB 19314. 15 pp. Photostat, $1; Microfilm, 50c.

Vulkacit TR. In German. Data on accelerator, produced by I. G. Farbenindustrie, which works best in mixture with sulfur and stearic acid. Enlargement print of part of Microfilm 185-2.—Report No. PB 19311. 3 pp. Photostat, $1; Microfilm, 50c.

Various Problems Regarding Mixtures for Cable Insulation. Notes taken at Kabelwerk Duisburg.—Report No. PB 18258. 6 pp. Photostat, $1; Microfilm, 50c.

Synthetic Rubber Desmodur "R". By Walter Lee. Discusses the development and use of the synthetic adhesive material developed by I. G. Farbenindustrie for bonding rubber to fabric in the manufacture of tires.—Report No. PB 27521. 9 pp. Photostat, $1; Microfilm, 50c.

Manufacture of 1:4 Butinediol at I. G. Ludwigshafen, Including Manufacture of 1:4 Butanediol and Tetrahydrofuran, Precautions in Handling Acetylene, and Semi-Technical Preparation of 1:4 Butenediol. By C. G. S. Appleyard and J. F. C. Gartshore.—Report No. PB 28556. 134 pp. Photostat, $9; Microfilm, $3.

List of Foreign Patents in the Rubber, Gutta Percha, and Balata Field. In German. Prepared by Deutsche Kautschuk Gesellschaft, covering December, 1937, to January, 1938.—Report No. PB 18501. 6 pp. Photostat, $1; Microfilm, 50c.

Characterization of Butadiene Catalysts by X-ray and Chemical Analysis. By J. F. C. Gartshore and J. D. Rose. The work of Dr. von Susich at the Ludwigshafen plant of I. G. Farbenindustrie is described and compared with the Lebedev process.—Report No. PB 28894. 7 pp. Photostat, $1; Microfilm, 50c.

W. L. Sturtevant Retires

Walter L. Sturtevant, associated with the Manhattan Rubber Division of Raybestos-Manhattan, Inc., for the past 34 years, and often called the dean of the mechanical rubber goods field, has retired from the active business world. More than 100 friends and co-

W. L. Sturtevant

workers attended a retirement dinner given in Clifton, N. J., on December 17.

Born in Bangor, Maine, on June 20, 1879, Mr. Sturtevant attended Bangor High School and was graduated from the University of Maine in 1908 with B.S. and Chem. E. degrees. During his college years he was a member of various athletic associations, president of the Maine University Athletic Association, editor of one of the University papers, and also served as correspondent for several Maine and Boston newspapers. After being graduated, he spent two years in lumber camps.

Mr. Sturtevant entered the rubber industry in 1910, joining the General Electric Co. as a chemist at its West Lynn, Mass., plant. One year later he joined the former Rutherford Rubber Co. in Rutherford, N. J., and in 1912 became associated with the Manhattan Rubber Mfg. Co. at Passaic, N. J., also as a chemist. From 1917 to 1931 he served the company as chief chemist and assistant superintendent, and from 1931 to date he has been a chemical engineer, representing the company on various government and scientific organizations.

An active member of various organizations, Mr. Sturtevant's memberships included the A.C.S., the A.S.T.M., the New York Rubber Group, and others. He was chairman of the New York Rubber Group in 1930, and acted as chairman of various A.S.T.M. committees. In addition, he has been Manhattan Rubber's representative on the Technical Committee of Mechanical Rubber Goods of the Rubber Manufacturers Association since 1917. During the last war, he served as a member of the Rubber Conservation Committee of the U. S. Navy, and was awarded a naval ordnance emblem for distinguished service. Mr. Sturtevant is also the author of numerous technical articles on the manufacture and testing of mechanical rubber goods.

Unload Largest Cargo

A cargo of natural rubber, valued at $3,240,000 and consisting of 72,000 bales, was unloaded at Boston on December 31. The cargo, largest consignment of natural rubber ever to arrive in the United States, was brought in by the British freighter *Samboston*, out of Penang. It was diverted from its New York destination to Boston to speed up unloading. The cargo was also said to be the forerunner of a large volume of rubber to be moved through Boston ports.

Dow Purchases Velasco Units

Dow Chemical Co. has purchased surplus portions of the Dow-Velasco plants at Velasco, Texas, from the War Assets Administration for $35,155,000. The government paid $48,998,272 for the property included in the sale. Included were all the facilities of the big magnesium works, except the magnesium metal-producing plant, and the styrene and Thiokol N plants which cost the government $17,096,825 and $1,386,737, respectively, and a 725-acre tract northwest of Velasco in which the government has an investment of $141,326. The portion of the magnesium plant to be sold originally cost the government $30,373,384 which was about half of the original cost for the magnesium facilities.

Sparks Succeeds Frolich

Dr. William J. Sparks, who has been actively associated with the development of Butyl rubber, has been named director of the Chemical Division of the Esso Laboratories, Standard Oil Development Co., Linden, N. J. Dr. Sparks replaces Dr. Per K. Frolich, who has resigned from the company to assume the post of coordinator of research of Merck & Co., Inc., Rahway, N. J.

Essex Wire Obtains Loan

Essex Wire Corp., Fort Wayne 6, Ind., has concluded negotiations with the Metropolitan Life Insurance Co. for a loan of $7,000,000 on a 3½% note, due December 1, 1961. The proceeds will be used to retire bank loans and for working capital. The C.I.T. Financial Corp. and Lehman Bros. negotiated the loan.

Naugatuck Opens Coast Branch

To supply the rapidly growing rubber industry on the West Coast, the Naugatuck Chemical Division of the U. S. Rubber Co. has opened its own branch office at 19201 South Vermont Ave., Los Angeles, Calif., for the sale of all Naugatuck chemicals, including

J. R. Morath

rubber chemicals, latex and Lotols, Dispersite, agricultural chemicals, aromatics, plastics, and resins. The branch office will also have equipment for preparation of Lotols and the drumming of natural and synthetic latex. J. Raymond Morath, who has been the Naugatuck Chemical representative in the Chicago, Ill., area for the past ten years, has been appointed branch manager in charge of the new office. He will be assisted by Curtis Wolter on agricultural chemicals and Henry Reardon on aromatics.

Set Rubber Wage Talks

Negotiations between the United Rubber, Cork, Linoleum & Plastic Workers of America, CIO, and U. S. Rubber, Goodyear, Goodrich and Firestone on the union's recent demand for a 26-cent-an-hour wage increase, are scheduled to begin on January 27 at Chicago. Negotiations will cover approximately 40 plants and 100,000 employees and any decisions reached are expected to set the pattern for the entire rubber manufacturing field.

To Sponsor Trophy Race

Sponsorship of a $25,000 Goodyear Trophy Race for light planes at the National Air Races in Cleveland, Ohio, during the Labor Day week-end of 1947 has been announced by the Goodyear Tire & Rubber Co., Akron. The purpose of the Goodyear sponsorship of this race, which will be undertaken for three years, is to encourage the design of light planes.

NAMES IN THE NEWS

GEORGE E. KELSHEIMER, associated with Rose Rubber Products, Nashville, Tenn., for several months, is now with the motor products development department of the U. S. Rubber Co. at Detroit, Mich.

JOHN "JACK" DUGALL, until recently with the Perth Amboy, N. J., plant of the General Cable Corp., has been transferred to the company's St. Louis plant as plant manager, succeeding A. W. HAGEN, now located at the Los Angeles plant.

EARL BUNTING, president of the O'Sullivan Rubber Co., was recently elected president of the National Association of Manufacturers for 1947.

C. E. SCHERMERHORN, who has been conducting a rubber consulting business in Newark, N. J., has joined the Broadway Rubber Mfg. Co., Louisville, Kentucky, where he will be in charge of manufacturing.

THOMAS D. CABOT, vice-president, treasurer and general manager of Godfrey L. Cabot, Inc., was recently elected a member of the National Industrial Conference Board.

ARTHUR A. REGEL, formerly associated with the U. S. Rubber Co., was recently appointed chief chemist of Harte & Co., New York City, manufacturers of "Wataseal" plastic materials.

T. C. Keeling, long associated with the Koppers Co., Pittsburgh, has been appointed manager of the sales department in the company's chemical division.

C. F. BROWN, associated with the U. S. Rubber Co. as a research and development chemist for the past 10 years, recently left that company to accept an appointment as Professor of Chemistry and head of the Department of Chemistry at Bethany College, Bethany, West Va.

JOSEPH E. FULLER, until recently associated with the Rome, N. Y., plant of the General Cable Corp., is now at the DuPont Rubber Laboratory in Wilmington, Del., assigned to wire and cable problems.

ROBERT L. RICHARDS, formerly assistant manager of the rayon Department of E. I. duPont de Nemours & Co., has been named assistant general manager of that department.

I. U. EGGERT, vice-president and treasurer of the Henrite Rubber Co., Ironton, Ohio, since 1929, has announced his retirement from that company.

C. HUIZING, associated with the Watson-Stillman Co., Roselle, N. J., for the past five years, has been named New England representative for that company.

R. S. KEEFER, formerly sales manager of the Okonite Co., Passaic, N. J., has been named vice-president in charge of sales of that company and will be responsible for directing all sales activities of the company as well as of its Hazard Wire Works Division.

DAVID E. WELCH, associated with the Office of Rubber Reserve for the past three years, and prior to that with the B. F. Goodrich Co., has joined the sales department of the Naugatuck Chemical Division of the U. S. Rubber Co.

FRANK J. SODAY, formerly technical director of the Baton Rouge, La., plant operated by the Copolymer Corp. for the Office of Rubber Reserve, has been named research director at the Central Research and Product Development Laboratories of Devoe & Reynolds, Inc.

DR. CHARLES A. THOMAS, vice-president and technical director of the Monsanto Chemical Co., St. Louis 4, Mo., has been elected president of the American Chemical Society for 1947.

GENE TUNNEY, formerly the world's heavyweight boxing champion, has been elected chairman of the board of the Denman Tire & Rubber Co., Warren, Ohio.

CHARLES W. PENNINGTON, sales manager of the Pacific Coast Division of the U. S. Rubber Co. since 1940, has been appointed sales manager of the company's clothing and coated fabrics, with headquarters in Mishawaka, Ind.

DR. G. MILLER HEBBARD, formerly associated with the Office of Rubber Reserve, has been appointed vice-president in charge of operations for the Davison Chemical Corp., Baltimore, Md.

MORRIS E. LEEDS, chairman of the board of the Leeds & Northrup Co., Philadelphia, Penna., recently received the highest honor of the American Society of Mechanical Engineers, the A.S.M.E. Medal, "because of outstanding achievements in the invention and development of electrical and temperature measuring instruments."

EUGENE TIKKANEN, who has been working on problems pertaining to production and engineering at the Willoughby, Ohio, plant of the Ohio Rubber Co. since 1944, has been named superintendent of the company's plant in Conneautville, Penna.

Changes in Research Staff

Several changes in its research staff have been announced by the Firestone Tire & Rubber Co., Akron. Dr. J. W. Liska, who has been a member of the Firestone research staff for the past fourteen years, has been appointed an assistant director of the company's chemical and physical research laboratories, succeeding Dr. J. H. Dillon, who recently became director of the Textile Research Foundation and Textile Institute at Princeton, N. J. Dr. R. F. Dunbrook, who was chief of the Polymer Research Branch of the Office of Rubber Reserve until recently, has resumed his prewar responsibilities at the Firestone Research Laboratories, where he and Dr. O. D. Cole are assistant directors of research in their respective fields.

ROBERT B. BENNETT, formerly director of organic research of the American Brakeblok Division of the American Brakeshoe Co., is now associated with the Firestone Research Staff at Akron.

ROBERT G. DONOVAN, until recently associated with the Dewey & Almy Chemical Co. as a research chemist, is now instructor in chemistry at Rensselaer Polytechnic Institute, Troy, N. Y.

RICHARD W. KIXMILLER, long associated with the government synthetic rubber program, most recently with the Office of Rubber Reserve, has been named director of product development of the chemical division of the Celanese Corporation in New York City.

CARL C. MONRAD, who served as chief of the butadiene and styrene branch of the Office of the Rubber Director during the war, has been appointed head of the chemical engineering department at the Carnegie Institute of Technology, Pittsburgh, Penna.

ELMER BARTLETT, until recently technical superintendent of the Rome, N. Y., plant of the General Cable Corp., is now assistant to the president of the Holyoke Wire & Cable Co., Holyoke, Mass.

ADMIRAL WILLIAM F. HALSEY, JR., who recently retired from the Navy after serving as commander of the Third Fleet during World War II, has been elected a member of the board of directors of the Carlisle Tire & Rubber Co., Carlisle, Penna.

HENRY S. CURTIS, formerly associated with the Westvaco Chlorine Products Corp., has been appointed manager of the Painesville, Ohio, chemical plant now under construction by the Glenn L. Martin Co., while ROBERT H. KITTER, formerly associated with the American Hard Rubber Co., has been named manager of the company's plastics and chemicals division, which will operate the plant.

PAPERS ON RUBBER GIVEN AT SAE MEETING IN DETROIT

The 1947 annual meeting of the Society of Automotive Engineers, held at the Book-Cadillac Hotel in Detroit, Mich., from January 6 to 10, featured the presentation of several papers of direct interest to the rubber industry. The papers were delivered by David R. Pearl, of the Hamilton Standard Propellers Division of the United Aircraft Corp., East Hartford, Conn., J. E. Hale, of the Firestone Tire & Rubber Co., Akron, and Allan J. Carter, project engineer of plastics, cements, and sealers of the Chrysler Corp., Detroit, Mich.

In his talk, Mr. Pearl revealed that a new synthetic rubber O-ring, or "doughnut," seal can be made perfectly leakproof with static pistons and cylinders, satisfactorily leakproof with reciprocating pistons and cylinders, for fluid pressures up to 5,000 pounds per square inch, and temperatures ranging between —60° F. and 250° F. He said that the "doughnut" seals can be used not only in hydraulic mechanisms, but can replace flat surface gaskets under cylinder and bolt heads.

Need for Synthetic Output

Discussing the need for continued synthetic rubber production in his talk, Mr. Hale warned that the domestic manufacture of synthetic rubber is necessary in order to maintain an adequate supply and to prevent this country from being at the mercy of others as regards supplies and prices. He declared that further scientific development will produce synthetic tires, tubes, and other rubber products which are equal, if not superior, to those made from natural rubber. Not only is it desirable to get low basic costs with proper quality of synthetic rubber, Mr. Hale pointed out, but it is of greater importance to get the production of synthetic rubber under American commercial control so that we can avoid the enormous fluctuations in price which the rubber industry had to tolerate over the years. He insisted that the wartime synthetic rubber plants, in which the American public has invested $700,000,000, be used for productive purposes before the country again becomes dependent upon foreign sources.

In his talk on "Automotive Cements and Sealers," Mr. Carter presented a general discussion on each important cement and sealer used in the modern automobile, and placed particular emphasis on the requirements necessary for their successful application. The application of sealers is considered a relatively easy operation for continuous production line processes, he stated. The operation consists of placing the sealers in specific locations usually by means of flow guns. The physical properties of the materials used are adjusted to meet the production assembly requirements. Then appropriate specifications are set up to insure consistent properties.

Discussing the use of cements in the fabrication of the automobile, Mr. Carter declared that the application of cements is critical if satisfactory results are to be obtained, since care must be taken to use the correct amount of cement and to provide the appropriate drying times for the assembly operations. If cements are chosen wisely and used properly, they will perform satisfactorily, he said.

Croakman Joins Binney & Smith

Effective January 1, Elmer G. Croakman will head Binney & Smith, Ltd., in Toronto, Canada, with headquarters at 33 Edward St. Under Mr. Croakman, a Montreal office will be set up to handle accounts in that territory. H. L. Blachford has handled the company's business in Canada for several years, and the change was made only because Binney & Smith feel that Canadian business has reached such a volume that an office devoting full time to the company's products is now essential. Mr. Croakman, well known in the Canadian territory, was graduated from the University of Buffalo in 1918. From 1918 to 1926 he was associated with the National Aniline & Chemical Co. From there he went to Akron to become assistant chief chemist of the Philadelphia Rubber Works Co. and later became sales representative for the Canadian territory. In recent years Mr. Croakman has covered other territories for Philadelphia Rubber as well, but always retained his Canadian coverage.

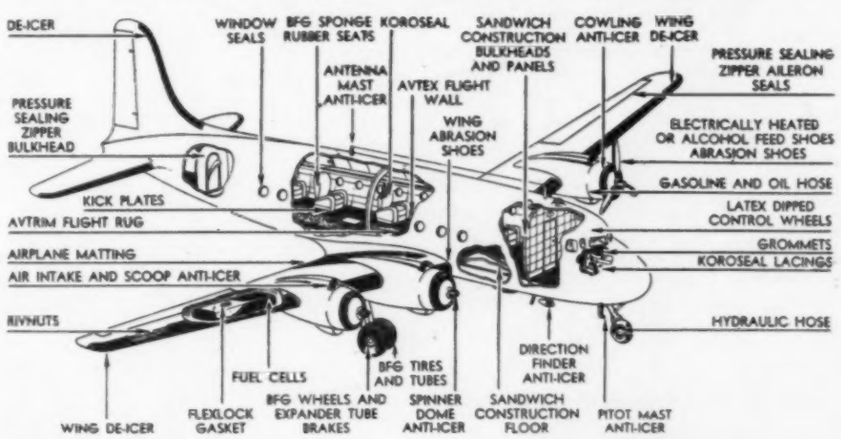
GRANT RECEIVED BY STANFORD FOR RUBBER RESEARCH PROJECT

Stanford University has received a grant of approximately $150,000 from the Office of Naval Research for an eight-month research project on natural rubber. The project, to be carried on at Salinas, Calif., and in the university's laboratories, will be administered by the newly established Stanford Research Institute, headed by Dr. William F. Talbot. Work on the project is already under way and will continue under the present grant until July 1, 1947.

The aim of the research program will be to develop, through studies of guayule and other plants, improved strains and hybrids which will give such a large yield of rubber that they could, if necessary, meet the country's needs for natural rubber without interfering with its food economy. Another objective of the program will be to develop more efficient and economical processes of separating the rubber from plants, other than guayule, with an end product higher in quality than is now possible. Facilities to be used in the project include four government-owned laboratories at Salinas and 340 acres of farm land there now planted with a wide variety of guayule strains.

Personnel engaged in the research program include: Dr. Reed C. Collins, assistant professor of biology at Stanford University, who was with the government's special guayule project until its curtailment; Dr. D. U. Gerstel, expert on plant genetics at the University of California; and W. E. Rand, formerly associated with the Sun Chemical Corporation.

RUBBER AND PLASTIC PRODUCTS EMPLOYED IN THE MODERN AIRPLANE



CEMENTS — USED TO APPLY FLIGHT RUG, AVTRIM, EXTRUSIONS, ABRASION SHOES, ZIPPERS, ETC.

Prepared by The B. F. Goodrich Company

Increased capacity, speed and range of the modern airplane have brought a constant upswing in the number of rubber and plastic products used in its construction as well as in the quantity of the material utilized. The diagram above, prepared by the B. F. Goodrich Co., Akron, shows 32 of these products, prominent among them being the pneumatic De-Icers and electrical Anti-Icers, exclusive developments in recent years of the company.

Report on German Chemicals

Chemical formulas and detailed information on the manufacture of chemicals in the I. G. Farbenindustrie plant at Leverkusen, Germany, are contained in a report released recently by the Department of Commerce. Prepared for the Combined Intelligence Objectives Subcommittee by L. C. Turnock and F. R. Lowdermilk, the report describes industrial uses for the wide variety of organic and inorganic chemicals produced at Leverkusen, as well as manufacturing methods, unit costs, and power requirements for production. Numerous flow sheets are included. Among the chemicals discussed in the report are lithopone, titanium compounds, zinc compounds, phenol, diphenyl, disocyanates, amines, chlorinated hydrocarbons, piperidine, rubber accelerators, rubber antioxidants, and resins. Copies of the report may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, D. C., for $6 in photostat form and $1 in microfilm form.

Equipment Concerns Consolidate

Eastern Engineering Co., New Haven, Conn., manufacturer of midget pumps for industrial and laboratory use and of industrial mixing equipment, has been consolidated with the Automatic Signal Corp., East Norwalk, Conn., makers of automatic traffic signals and relays. The new corporation, to be known as Eastern Industries, Inc., will be located at New Haven 6, Conn. Personnel of both operating divisions will remain substantially the same under the new organization and will continue to manufacture the same products.

High Purity Isooctane

A paraffin hydrocarbon of high purity (2,2,4-trimethylpentane), which is said to be potentially usable as a special solvent and a chemical intermediate, has been developed by the Phillips Petroleum Co., Bartlesville, Okla. Preliminary examination of production stream samples of the new isooctane product is said to indicate the purity to be over 99.9 mol per cent. Other properties of the new material are a density at 20° C. of .6919, freezing point of —107.37° C., and boiling point of 99.24° C.

Booklets on Personnel Relations

A series of booklets on personnel relations has been made available by the American Management Association, 330 West 42nd St., New York 18, N. Y. Among the subjects included in this series are the following: New Concepts in Collective Bargaining, Reconciling Labor and Management Philosophies, Constructive Employee Relations in Unionized and Non-Unionized Shops, and Rating and Training Executives and Employees.

Additional Research Reports

The British Rubber Producers' Research Association, Welwyn Garden City, Herts., England, has made nine additional reprints available of articles appearing in various British technical and scientific journals prepared by members of its staff in its program of fundamental rubber research. Titles of these articles, and their authors, follow:

The Structure of Polyisoprenes. I. The Crystal Structure of Geranylamine Hydrochloride. By G. A. Jeffrey. (Publication No. 61.)

Two New Modifications of the Fourier Method of X-Ray Structure Analysis. By A. D. Booth. (Publication No. 62.)

The Course of Autoxidation Reactions in Polyisoprenes and Allied Compounds. Part IX. The Primary Thermal Oxidation Product of Ethyl Linoleate. By J. L. Bolland and H. P. Koch. (Publication No. 63.)

Research on Pneumatic Tires for Farm Tractors. (Publication No. 64.)

Contributions to Symposium on Breakdown of Rubber. I. Oxidative Breakdown of Rubber. By E. H. Farmer. II. Photochemical Breakdown of Rubber. By L. Bateman. III. Thermal Breakdown of Rubber. By J. L. Bolland and W. J. C. Orr. (Publication No. 65.)

Rubber, Polyisoprenes and Allied Compounds. Part VIII. The Formation of Dialkyl Sulfide Dihalides and Its Bearing on the Problem of Determining the Unsaturation of Vulcanized Rubber. By George F. Bloomfield. (Publication No. 66.)

The Cause of Autoxidation Reactions in Polyisoprenes and Allied Compounds. Part XI. Double Bond Movement During the Autoxidation of a Mono-Olefin. By E. Harold Farmer and Donald A. Sutton. (Publication No. 67.)

The Elasticity of a Network of Long-Chain Molecules. III. By L. R. G. Treloar. (Publication No. 68.)

The Statistical Length of Long-Chain Molecules. By L. R. G. Treloar. (Publication No. 69.)

Hillsdale Plant in Operation

The Hillsdale, Michigan, plant of the Monroe Auto Equipment Co., which has been under construction for the past several months, is now in operation. The plant comprises about 200,000 square feet of floor space which, in addition to rubber manufacturing operations, also contains tire pump, and truck and tractor seat assembly lines. The rubber section features eight Monroe injection molding machines, with major production being relegated to the company's own requirements. It also features one of the first mill-less mill rooms, the Banbury discharging directly into a pelletizer, the pellets being discharged into hoppers over the molding machines after passing through spray and drying chambers. Don F. Fraser is manager of the company's rubber division.

Rubber Manufacturers in China

According to a recent UNRRA report, there are 40 factories in Tientsin, China, producing rubber goods of various types, of which 29 are Chinese-owned and 11 were formerly owned by Japanese. Most of the latter were taken over by the Ministry of Economic Affairs. This industry, when it was working full time, is reported to have employed about 3,100 workers and produced 752,000 pairs of canvas shoes, 10,000 rubber boots, 16,150 dozen rubber soles, and 28,000 dozen rubber heels per month. Other monthly production included 76,800 bicycle tires, 278,000 bicycle tubes, 17,000 kilograms of hose, 8,400 inner tubes for automotive tires, and 134,000 feet of rubber belting. Although Chinese factories were operating at about 20% of normal production and Japanese at about 30% early in 1946, raw material stocks are believed to have been exhausted by July.

Ohio-Apex Develops Dinopol

Ohio-Apex, Inc., Nitro, W. Va., has announced the development of Dinopol, a new water insoluble plasticizer which is highly recommended by the company for use with cellulose acetobutyrate, cellulose acetopropionate, and ethyl cellulose. With polyvinyl resins its properties are said to indicate highly satisfactory use in proofed goods, shower curtains, rainwear, electrical applications, and hospital sheeting. It has a volatility of 0.25% after 24 hours at 105° C., as well as a freezing point of —20° C., flash point of 219° C., fire point of 260° C., viscosity of 40 centipoises at 20° C., and a refractive index of 1.482 at 25° C.

Use New Chemical Process

Production of a wide range of organic chemicals manufactured by a new process from naphtha and gas oil in a plant now under construction at Manchester, England, is scheduled to begin in 1948, according to recent reports from London. The new process, called Catarole, produces simultaneously in a high state of purity benzene, toluene, styrene, fluorine, ethylbenzene, xylene, alkyl benzenes, naphthalene, and other hydrocarbons, all of which may be obtained in pure grades by distillation and crystallization with only slight additional chemical treatment. A pilot plant has been in operation since 1941.

Presentation of Machine Age

Packed full of interesting facts, observations and clues to solutions of basic economic problems of today, two unique educational pieces, one a pictorial wall chart in colors and the other a booklet, entitled "Your Life in the Machine Age," have been offered by the DoAll Co., Des Plaines, Ill. The purpose of this educational presentation is to acquaint industrial managers and workers, school instructors and students in the ways of today's complex machine age.

Past Performance...

...A RELIABLE INDEX OF
Future Achievement

STATEX-93
A COLUMBIAN COLLOID

ALWAYS THERE IS A *Leader*

COLUMBIAN CARBON CO. • BINNEY & SMITH CO.

MANUFACTURER DISTRIBUTOR

TENSILE

Tensile tests on a Statex-93—GR-S tread compound at room temperature show results such as would be expected with carbon of six-acre surface. Values are approximately 80% of those developed by the same loading of Micronex in GR-S.

Tested at higher temperatures similar to those developed in road service, tensile figures for Statex-93 treads are substantially the same as for Micronex treads. Tests at 220° F show full equivalence between Statex-93 and EPC type channel carbon.

When specimens are subjected to flexing prior to testing another striking characteristic of Statex-93 is revealed — tensile does not fall off as rapidly as in the case of compounds containing channel carbons.

We will be pleased to furnish further information.

MICRONEX *For 35 Years*
the Standard Reinforcing Carbon

STATEX-B *The Carbon*
for Dynamic Reinforcement

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The High Resilience Carbon

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NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those listed in our last issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue.

X-No. Designation	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*	*Special Characteristics*
X-344 GR-S	U. S. Rubber, Institute	10/25/46	A non-staining variation of X-285 GR-S containing 1.5 parts of IBUL	This material should show superior processing, low shrinkage characteristics and improved surface appearance. Exhibits faster curing tendencies and improved retention of physical properties after aging.
X-346 GR-S	Goodyear, Houston		Standard bale GR-S.	
X-348 GR-S	General, Baytown	11/5/46	Same as GR-S Black I except that carbon black loading shall be 46 ± 2.	Carbon black masterbatches are reported to have superior processing and handling characteristics; for use in stock requiring this type of material.
X-349 GR-S	Goodrich, Louisville	11/18/46	A copolymer made with a limited amount of Dixie modifier fed increment wise. Because of its high Mooney, heat softening is required to obtain satisfactory processing; polymerization temperature and conversion lower than usual. Coagulated with salt and acetic acid. Similar to German Buna S-3.	It is hoped that superior tread wear in tires made from this polymer will be exhibited.
X-351 GR-S	U. S. Rubber, Institute	12/6/46	Black GR-S containing 50 parts EPC black to 100 parts GR-S; Mooney viscosity 38 ± 5. Similar to X-298.	Carbon black masterbatches are reported to have superior processing and handling characteristics; for use in stock requiring this type of material.
X-352 GR-S	U. S. Rubber, Torrance	12/6/46	Same as GR-S-10 except that Mooney viscosity is between 45-55.	Slight improvement in Banbury or plasticator breakdown is to be expected.

Establishes Sales Organization

A new sales organization known as W. Miller Cook Associates, Inc., has been established at 1962 Union Commerce Building, Cleveland 14, Ohio. A wide diversity of rubber products will be sold on a nationwide basis by the new company, including molded, extruded, lathe-cut, hard and soft rubber, molded sponge rubber parts and semi-pneumatic tires. W. Miller Cook, president of the company, was formerly vice president in charge of general sales of the Ohio Rubber Co. with which he served in various capacities for more than 27 years.

Florida Rubber Plant Gutted

A pre-dawn fire practically gutted the plant of the Florida Rubber Corporation near Miami, Florida, on January 2. Estimates of the loss varied from $175,000 to $500,000. The fire is believed to have started from a pile of ground rubber which had been processed in preparation for use. The company plans on renewing its operations in the near future, probably in some other location. Most of the loss is believed to have been covered by insurance.

Purchasing Planning Data

Among the latest industrial preparedness planning projects of the Army and Navy is a program covering the purchasing of production planning data from various leading aircraft and aeronautical equipment manufacturers. Under this new program the Goodyear Tire & Rubber Co. will supply information of production possibilities on airplane wheels and brakes. The Goodyear Aircraft Corp. is also submitting data on its production problems and possibilities on prototype airplanes.

Aridye Corp. Becomes Division

The Aridye Corporation, heretofore a wholly-owned subsidiary of the Interchemical Corporation, has become a division of the parent company and will henceforth be known as the Textile Colors Division of the Interchemical Corporation. The change is one in corporate organization only, and the new division will carry on the manufacture and sale of Aridye pigment colors and Interchem dyes at Fair Lawn, N. J.

Goodrich Chemical Bulletins

Three new technical bulletins on its Vultrol and Good-rite Erie materials have been made available by the B. F. Goodrich Chemical Co., Rose Building, Cleveland 15, Ohio. Service Bulletin 46-RC1 gives data on the use of Vultrol as a retarder of scorch, especially in GR-S stocks, and as an aid in the processing of scorched or bin cured GR-S stocks; Service Bulletin 46-RC2 covers the use of Vultrol in processing Hycar OR 15; and Service Bulletin 46-RC3 contains data on GR-S tread stocks, GR-S carcass stocks, and Reclaimed GR-S carcass stocks accelerated with Activated Good-rite Erie.

Glidden to Market Lecithin

The formation of a Lecithin Sales Division, under the direction of J. H. Lathe, formerly western sales manager of the company's chemical and pigment division, has been announced by the Glidden Co., Cleveland, Ohio. One of the largest processors of soy beans in the world, Glidden produces lecithin at its large soya bean processing plant in Chicago. Lecithin finds application in the rubber field as a wetting agent for latex, among other applications.

Three Rubber Pacts Expire

The U. S. Department of State announced on December 31 that in accordance with mutual cancellation provisions, the rubber purchasing agreements with Ecuador, Haiti and Bolivia expired as of that date. These agreements were among those concluded during the wartime period with 17 rubber-producing countries in the Western Hemisphere.

With the exception of Venezuela, all agreements originally provided for December 31, 1946, as the expiration date or for earlier cancellation by mutual agreement. In April, 1945, an offer to extend them to June 30, 1947, was accepted by 12 countries. To date, agreements by mutual cancellations have been ended with Guatemala, El Salvador, Honduras, British Honduras, Ecuador, Haiti and Bolivia. The pact with Venezuela expired on October 12, 1946.

Nine agreements are still active and will remain in effect until June 30, 1947, unless cancelled prior to that time by mutual consent. These agreements are with Brazil, Peru, Colombia, Costa Rica, Nicaragua, Panama, Mexico, British Guiana, and Trinidad and Tobago.

German Handling of Acetylene

Many of the secrets of German success in handling acetylene in chemical operations at unusually high temperatures and pressures are revealed in a report released recently by the Department of Commerce. A major difficulty in the use of acetylene is that it decomposes rapidly under high pressures and temperatures. This safety hazard, the report points out, has seriously limited its use in industrial processes. By solving many of the safety hazards involved, it is said that German researchers have made possible the manufacture of many products requiring the use of acetylene under high pressures and temperatures. Copies of this report (PB-20078), which supplements many other reports on the use of acetylene in Germany previously released by the Department of Commerce, may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, D. C., for $16 in photostat form and $2.50 in microfilm form.

Control of Aniline Hazards

Safety precautions for the industrial use of aniline in the rubber, aniline dye, pharmaceutical, and ink industries and in the intermediate manufacture of many organic compounds are outlined in a bulletin issued recently by the Division of Labor Standards, U. S. Department of Labor, Washington 25, D. C. Among the preventive measures covered in the bulletin are isolation and ventilation of storage and manufacturing processes, use of protective clothing, short exposure, and adequate bathing facilities. The bulletin is the fifth in a series issued under the general title "Controlling Chemical Hazards."

Collyer Receives Merit Medal

John L. Collyer

John L. Collyer, president of the B. F. Goodrich Co., has been awarded the Medal for Merit for exceptional wartime service by the War Department. The presentation, first given to any rubber industry executive, was made in Washington on December 19 by Secretary of War Robert Patterson. In making the presentation, Secretary Patterson recounted Mr. Collyer's advocacy of establishing national facilities for manufacturing synthetic rubber 18 months before Pearl Harbor, his role as advisor to the State Department on world rubber problems since 1944, and his service as Special Director of Rubber Programs during the crucial stage of the war. In accepting the medal, Mr. Collyer said that while he was the recipient of the award, he recognized that it was meant for the industry and for the people who worked on synthetic rubber development.

Prices of Hycar Increased

An upward revision in the price of Hycar, which is the first after a record of six reductions in price within a period of five years, has been announced by the B. F. Goodrich Chemical Co., Cleveland 15, Ohio. Under the new schedule, Hycar OR-25 and Hycar OS-10, in dry rubber form, range in price from 40c to 42.5c per pound, depending upon quantity, while Hycar OR-15 ranges from 47c to 49.5c. In latex form, Hycar OR-25 ranges in price from 38.5c to 44c, while Hycar OR-15 ranges from 45.5c to 51c. Prices are slightly higher on the West Coast.

Applications of Silicone Rubber

Several new applications for G-E silicone rubber have recently been announced by the Chemical Department of the General Electric Co., Pittsfield, Mass., producers and fabricators of the material. These include the manufacture of gaskets for high temperature equipment, such as diesel engines, gas turbines and air compressors; press pads for heat sealing equipment and for the pressing of sheet mica; and gaskets for use in powerful new radial engine motors, in jet engines, and in a new type of oil seal which operates around high speed shafts at temperatures of 350° to 400° F. When used for the pressing of sheet mica, the silicone rubber is laminated with layers of asbestos cloth to provide a pressing pad that insures an even bond over the entire sheet. G-E silicone rubber remains practically unaffected when subjected to temperatures from —55° F. to 520° F., is highly chemical and moisture resistant, and provides good electrical insulation.

Tributyl Aconitate Plasticizer

Considerable interest is reported to be developing in the use of tributyl aconitate as a plasticizer for certain types of synthetic rubber. Made by Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N.Y., tributyl aconitate is said to impart particularly good low temperature flexibility to such rubber. Furnished as a clear liquid, the material has a specific gravity of 1.018 at 20° C., a refractive index of 1.4532 at 26° C., a very slight odor, and weighs 8.50 pounds per gallon. Tributyl aconitate also finds application as a solvent plasticzer for nitrocellulose, cellulose acetate, ethyl cellulose, and other cellulose esters and ethers, as well as for other types of plastics. When incorporated in films, it is said to impart excellent resistance to light, both as regards discoloration and embrittlement. The films show excellent adhesion to metal even after prolonged exposure to water.

Merge All Huber Operations

The various Huber operations, heretofore conducted by three separate companies, have been merged under one company to be known as the J. M. Huber Corporation. No change in ownership or management has been made. Formerly, the Huber Co., Inc., operated clay mines and three clay refining plants, the J. M. Huber Corp. produced channel and furnace carbon blacks, as well as natural gasoline, and J. M. Huber, Inc., was the selling outlet of the Huber carbon blacks, clays and rubber chemicals, in addition to functioning as a manufacturer of ink. Under the merger, the Industrial Products Division has been organized to handle all pigment and chemical sales of the J. M. Huber Corporation. This division will shortly move its offices from 460 West 34th St. to 342 Madison Ave., New York 17, N. Y.

PATENTS CITED AS EVIDENCE OF SYNTHETIC RUBBER ADVANCE

In a recent statement, W. S. Richardson, president of the B. F. Goodrich Chemical Co., Cleveland, Ohio, cited the publication of 334 United States patents last year for improvements either in synthetic rubbers or in their product application as evidence of the continuous and intense work of many highly skilled technicians in this field.

Mr. Richardson revealed that the parent Goodrich company was responsible for 84 of the 334 patents. This activity was said to bear witness to the continued interest and faith in synthetic rubber of the company which was one of the pioneers in the development of these rubbers, and which produced and sold tires made with synthetic rubber of its own manufacture 18 months before the United States entered World War II.

The Goodrich Chemical president said that a survey of the 334 patents shows that their subjects fall into two general classes. One group consists of improvements in the preparation and purification of butadiene, and most of these inventions naturally came from laboratories of oil refiners and chemical companies concerned with its manufacture. The other group consists of inventions having to do with the actual manufacture of butadiene and its uses in making products, and these came principally from the rubber companies who built and operate rubber plants for the government.

In this latter category, one-half of the patents, 79 out of a total of 158, went to Goodrich. The company's other five patents were on the preparation and purification of butadiene.

Form New Export Agency

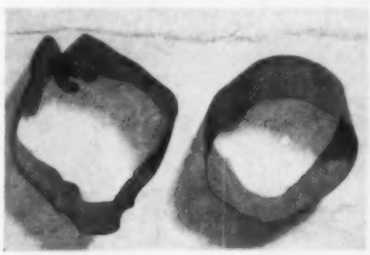
Ledel, Inc., was recently organized as an export-import agency, with headquarters at 225 Park Ave., New York 17, N. Y. The new company is acting as export agent for various European countries for both the R. T. Vanderbilt Co. and the Philback Division of the Phillips Petroleum Co. It is also acting in a similar capacity for all of Europe for Scott Testers, Inc. W. J. Van Lede, who represented the Vanderbilt organization in France from 1922 until recently, is president of Ledel, Inc. Other officers are Al Eufer, vice-president, and F. C. Gens, treasurer.

Creates Rubber Sales Unit

A new sales unit, the Rubber Chemicals Department, has been created by the Calco Chemical Division of the American Cyanamid Co., Bound Brook, N. J., to handle the sale of rubber chemicals to the rubber industry. The Rubber Chemicals Department of the American Cyanamid Co. has been merged with the new Calco sales unit. Bancroft W. Henderson, manager of the Rubber Chemicals Department of American Cyanamid Co., has been named to head the new Calco department.

Test Report on Neoprene Tubes

A series of tests were recently conducted by the Pharis Tire & Rubber Co. on the ability of red neoprene inner tubes to stand up under various extremes of temperature. The tests are reported to



indicate that neoprene is definitely resistant to creep which, in other synthetics, is accelerated by cold weather. In the tests, both neoprene tubes and conventional synthetic tubes were inserted in Pharis tires which were mounted on a 1940 model Ford wheel. The entire wheel assemblies were immersed in a bath of alcohol and, by means of dry ice, kept at a temperature of —40°F. for one hour. Soapstone was used as a lubricant. When the assemblies were removed from the bath, they were applied with all possible speed to cars and driven four miles at 35 m.p.h. They were then removed and examined. This cycle of immersing and driving was repeated 10 times. The results of the tests are indicated in the accompanying photograph. On the left is a cross section cut from a typical synthetic inner tube showing the buckle along the crown after 10 cycles of immersion and 10 four-mile trips. This buckling caused many ordinary synthetic tubes to crack open before completion of 10 trips. On the right is a neoprene tube after the same tests.

Buys North Bergen Plant

The plant and equipment of the North Bergen Rubber Mfg. Co., at 2021 Fortieth St., North Bergen, N. J., has been purchased by the O. G. Maigne Co., 356 Pearl St., New York 7, N. Y. The Maigne Company plans on manufacturing rubber printing rolls at the North Bergen plant which will be operated by the Graphic Manufacturing Co. F. G. Arnold, well-known rubber chemist, has been associated with the Maigne organization for the past two years.

Frolich Leaves Standard Oil

Dr. Per K. Frolich, associated with the Standard Oil Co. (N.J.) for many years as director of the Chemical Division, Esso Laboratories, Standard Oil Developments Co., has left that organization and has joined Merck & Co., manufacturing chemists, at Rahway, N. J., as coordinator of research. A former president of the American Chemical Society, Dr. Frolich holds the Grasselli Medal of the Society of Chemical Industry.

NEW SUBSIDIARY ORGANIZED BY STANDARD OIL COMPANY

Enjay Co., Inc., has been organized as a subsidiary of the Standard Oil Co. (N. J.) to take over the sale and distribution of all products handled by the Chemical Products Department of Stanco Distributors, Inc., and the Standard Alcohol Co. The new organization will handle the national and export marketing of numerous products based on synthetic chemicals derived from petroleum. Officers of the new company include H. W. Fisher, president; John A. Britton, Jr., and James G. Park, vice-presidents; W. F. Quick, secretary; H. P. Schoeck, treasurer; G. M. Buckingham, assistant secretary; and L. R. Moore, assistant treasurer.

In the past, the Standard Alcohol Co. had marketed various synthetic alcohols and related products with Mr. Park as vice-president and general sales manager. The Chemical Products Department of Stanco Distributors, Inc., had marketed synthetic rubbers and lubricant additives under the direction of Mr. Britton.

Under the new arrangement, Mr. Park will be vice-president and general sales manager of alcohols and related products with W. V. Rathbone as assistant sales manager. Perbunan synthetic rubbers and Vistanex, polymerized isobutylene, will be handled under the management of Mr. Britton, with I. E. Lightbown as assistant manager. Lubricant additives, called Paramins, are also under Mr. Britton's supervision with A. Bruce Boehm as assistant manager.

CelUSeal Plastic Film

A new type of non-porous plastic film, known as CelUSeal, has been developed by the U. S. Rubber Co. as a backing for tire and tube repair materials. Red in color and said to be dirt resistant, the backing consists of two plies of glossy, non-porous material. It is designed to preserve the quality of 100% natural rubber compounds being used in the company's repair materials. An embossed diamond design is said to maintain a more tacky surface and to provide channels to allow the escape of trapped air during its application.

Form Scheer Chemical Co.

Walter E. Scheer, who has been a vice-president of Amecco Chemicals, Inc., for the past several years, has announced the formation of the Scheer Chemical Co. 60 East 42nd St., New York 17, N. Y. The new company will function as a manufacturers' agent and technical sales and market development consultant for chemical manufacturers in the field of plastics, plasticizers, surface active agents, and fine chemicals. Mr. Scheer was employed by the Commercial Solvents Corp. for a number of years in market development and technical sales capacities.

FINANCIAL NEWS

FIRESTONE TIRE & RUBBER CO. REPORTS INCOME OF $27,682,877

Net income of the Firestone Tire & Rubber Co. for the year ended October 31, 1946, amounted to $27,682,877, after providing for all expenses, including $11,119,063 for depreciation and $71,499,280 for taxes and after adding $5,000,000 to the reserve for contingencies. This is equal to $13.21 a share on 1,950,834 common shares, and compares with $16,446,735, or $7.42 a share on 1,951,434 common shares, for the previous fiscal year, when $2,500,000 was set aside for contingencies, $30,242,337 for depreciation and amortization, and $65,789,178 for taxes. Net profits of $7,129,075 from foreign subsidiaries were included in net income.

Consolidated sales amounted to $577,833,422, as compared with $268,091,826 in 1941, the previous record for a peacetime year. For the year ended on October 31, 1945, sales amounted to $684,744,073.

The consolidated balance sheet as of October 31, 1946, indicated total current assets of $200,914,656 and current liabilities of $56,937,103, a ratio of approximately 3.5 to 1, which compares with $181,600,349 and $42,593,709, respectively, a ratio of approximately 4.25 to 1, for the previous fiscal year. Cash amounted to $30,117,305, against $28,512,158 and inventories were $98,895,787, compared with $81,851,590 for the fiscal year ended October 31, 1946.

A statement accompanying the report indicated that with the end of the war the company proceeded with its expansion plans for new products and added tire manufacturing facilities in this country and abroad. This expansion program included the purchase of the tire plant at Des Moines, Iowa, and the lease with option to buy of the plant which Firestone equipped for the manufacture of tires and plastics at Pottstown, Penna., both of which were leased and operated by the company during the war. The production of rubber on the Firestone Plantations in Liberia during the fiscal year was reported to total more than 48,000,000 pounds, a new record.

Firestone Registers Issue

Firestone Tire & Rubber Co. has filed a registration statement with the Securities & Exchange Commission covering the issue of $25,000,000 of twenty-five year debentures to finance retirement of 250,000 out of 414,000 outstanding shares of the company's 4½% preferred stock. Capitalization, after this financing, will consist of 164,000 shares of the $100 par value 4½% preferred stock, 1,950,834 shares of $25 par value common stock, $40,000,000 of 3% debentures due in 1961, and the issue of debentures registered.

Pantasote Registers Stock

Pantasote Co., Passaic, N. J., has filed a registration statement with the Securities & Exchange Commission covering the issue of 50,000 shares of $1 par value common stock for public offering. Proceeds of the financing are to be used for the purchase of new equipment and the construction of a warehouse. From this move, it is evident that expansion plans by Pantasote have not been completely abandoned with the cancellation recently of the proposed merger with the Textileather Corp. Upon completion of the proposed financing, outstanding capitalization of the company will consist of 40,000 shares of 5% $15 par value cumulative convertible preferred stock and 435,138 shares of common stock.

Negotiating $2,600,000 Loan

In a recent letter to stockholders, Hewitt-Robins, Inc., revealed that it is concluding a loan agreement of $2,600,000, bearing 2% interest for a five-year period, with a group of six banks. Part of the proceeds will be used to double the production of Restfoam, the company's latex foam rubber product, with the balance to be added to working capital. According to the letter, operations of the company in the last quarter of 1946 resulted in sales and profits higher than those reported for the three months ended September 30, despite continuing losses in the Restfoam Division, which was caused by expanded production in a pilot plant never intended for economic operation.

Dayton Rubber Mfg. Co.

Year Ended October 31 (Preliminary): Net income of $2,100,000, which is equal to $4.40 each on 453,341 common shares, and which compares with $431,466, or 75c a common share, for the preceding fiscal year when earnings were reduced by accelerated amortization of emergency facilities. Net sales amounted to approximately $32,000,000, as compared with $25,849,300 the year before.

Arranges $25,000,000 Credit

Electric Auto-Lite Co., Port Huron, Mich., has negotiated a credit of $25,000,000 with the Equitable Life Assurance Society, backed by promissory notes bearing 2.6% interest and repayable in semi-annual installments over fifteen years. Of the total, $15,000,000 has already been advanced. The company plans to use the funds for expansion, working capital, and to retire $3,000,000 of debentures.

Armstrong Rubber Co.

Year Ended September 30: Net income of $1,141,690, which is equal to $2.79 a share on Class A and B common stock, and which compares with $297,289, or 72c a share on A and B common shares outstanding, for the previous fiscal year. Net sales totaled $17,092,043, as compared with $10,683,258 for the previous fiscal year.

Norwalk Tire & Rubber Co.

Year Ended September 30: Net income of $469,827, which compares with $223,052 for the previous fiscal year. Sales amounted to $10,426,518, an increase of 18.2% over the previous year.

To Expand Cyclewelding

The Chrysler Corporation is reported to be building a $1,300,000 factory at Trenton, Michigan, for the manufacture of Cycleweld adhesives. Production at the plant is scheduled to get started by the middle of the year and the company expects to sell formulas to outside companies, although a substantial part of the plant's output will be used by Chrysler in its manufacture of automobiles. The most important use to which Cycleweld is currently applied is in the bonding of brake linings to brake shoes, eliminating riveting. Cycleweld is formulated of a phenolic substance with a synthetic rubber resin. It was developed jointly by Chrysler and the Goodyear Tire & Rubber Co.

Additional Navy Specifications

Four additional specifications on rubber have been issued by the Bureau of Ships of the Navy Department since our last report. They are:

Navy Dept. Spec. 33G8e—Gaskets, Asbestos-Metallic-Cover, Rubber Core (Oct. 15, 1946).

Navy Dept. Spec. 33H9c—Air Hose, Diving-Apparatus and Fittings (Nov. 15, 1946).

Navy Dept. Spec. 33H31a—Gasoline Hose, Synthetic Rubber, Wire-Stiffened (Oct. 15, 1946).

Navy Dept. Spec. 33R12—Synthetic Rubber, Cellular, Chemically Blown and/or Expanded (Nov. 1, 1946).

Airex Concern Expanding

Airex, Incorporated, which manufactures various molded rubber and latex products, including diaphragms, industrial mountings and aircraft specialties, is reported to be expanding its activities. Located at Gildersleeve, Conn., the company has been in active production for the past four years, largely on custom molded items. J. O. Hetrick is president of the firm, and Ralph H. Biermacher is treasurer and general manager. Virginia Biermacher is secretary.

Goodyear Frees Several Patents

A number of patents owned by the Wingfoot Corporation, subsidiary of the Goodyear Tire & Rubber Co., have been dedicated to the free use of the public, according to Supplement No. 1 to Dedicated Patents, recently issued by the U. S. Patent Office, Washington, D. C. Dedicated patents may be used by any citizen of the United States without the payment of royalties or the necessity of securing a license. The Wingfoot patents offered included the following: Method of and Apparatus for Curing Molded Rubber Article (Pat. No. 1,746,357); Method of and Apparatus for Curing Rubber Articles by the Circulation of Heated Gases (Pat. No. 1,757,053); Process of Curing Tires (Pat. No. 1,808,428); Method and Apparatus for Removing Water from Air Bags (Pat. No. 1,875,479); Method of Securing Adhesion of Rubber to Metal (Pat. No. 2,017,071); Method of Treating Pigments (Pat. No. 2,067,060); Methods of Treating Rubber (Pat. Nos. 2,095,673 and 2,148,572); Apparatus for Molding Sponge Rubber (Pat. No. 2,180,304); Sponge Rubber Article and Method of Making same (Pat. No. 2,199,006). Copies of these patents may be obtained from the U. S. Patent Office for 25c each.

Poly-Tint Aqueous Dispersions

Wilmington Chemical Corp., 10 East 40th St., New York 16, N. Y., has announced the development of Poly-Tint Aqueous Dispersions, which are true dispersions of pigments in liquid form, for the coloring of latices and aqueous dispersions of natural and synthetic rubber, polyvinyl chloride, polyvinylidene chloride, and similar materials. The company claims that these dispersions are highly fluid and the pigments used are light-fast and stable. The use of these colors is said to be extremely simple. No grinding or other preliminary treatment is necessary. The requisite amount of Poly-Tint is added directly to the latex or emulsion with simple agitation. The dispersions are available in four basic colors: 800A-Red, 810A-Blue, 820A-Yellow, and 830A-Black.

Wings Used on Test Cars

A section of an airplane wing attached to the side of a test car is being used by the U. S. Rubber Co. at its tire test proving grounds on a dry lake near Lancaster, Calif. Use of the wing section is said to counterbalance centrifugal force, enabling the test car to race around a circular track at sustained speeds of 90 miles per hour and more, without "scrubbing" the sides of its tires and with a minimum of danger to the driver. Since the wings have been added to the test cars, tire wear on the oval course has been reported to be practicaly the same as would be encountered on a straight highway.

Starts Export-Import Agency

Rolf G. Grote

Rolf G. Grote, formerly associated with the Wilmington Chemical Corporation, has started an export-import agency under his own name, specializing in the wire, cable, rubber and plastics industries. In announcing his entrance into the field, Mr. Grote emphasized that he would not handle a conflicting variety of products, but would concentrate on the intelligent promotion of a selected number of specialties. The new firm already has agency contacts in over 20 foreign countries and is interested in hearing from American manufacturers desiring foreign representation as well as foreign concerns requiring purchasing and shipping contact in the United States. Mr. Grote makes his headquarters at 1482 York Ave., New York 21, N. Y. The telephone number is REgent 7-4055. Rolf Grote is the son of Walter H. Grote, director of export of the Philblack Division of the Phillips Petroleum Co.

Rubber Production in Poland

According to recent reports in the Polish press, rubber factories in that country, destroyed during the war, are being rebuilt. Production at the beginning of 1946 was reported at 5% of the prewar rate, but amounted to 20% by June, and was expected to reach 40% by the year's end. It is anticipated that the "Pepege" plant in Crudziadz will soon resume operations, and will employ 1,000 persons.

New Uses for Pliofilm

Four new applications for Pliofilm, the company's waterproof rubber hydrochloride film, have been announced by the Goodyear Tire & Rubber Co., Akron. The film, which already has been used as a packaging material in the preservation of many fresh, frozen, and dehydrated foodstuffs, is now being utilized for packaging potato chips, dill pickles, liverwurst, and corn on the cob.

Vinyl Compound Stabilizers

National Lead Co., 111 Broadway, New York 6, N. Y., recently introduced two new compounding ingredients—Tribase, a stabilizer for vinyl plastics, and Plumb-O-Sil, a stabilizer produced in two types for use with vinyl chloride or vinylidene chloride polymers. Tribase is a hydrous, tribasic lead sulfate which is reported applicable in any compound where a white, highly reactive basic lead salt is needed. It has a total lead content equivalent to 90% PbO, while its available lead oxide content is 67.3. The company claims that Tribase may be considered as the "white litharge" so long sought by several industries. Plumb-O-Sil is a co-precipitated lead orthosilicate and silica gel in the form of a soft, white powder, and is particularly adapted for use when the vinyl or vinlyidene plastic application requires a stabilizer without tinting strength and one which will cause minimum impairment either to dye or other pigment additions. Plumb-O-Sil A is produced with a refractive index of 1.64 to 1.67, making it an ideal stabilizer for use in vinylidene chloride plastics, while Plumb-O-Sil B, with a refractive index of 1.58 to 1.60, is designed for use with vinyl-acetate plastics of approximately similar refractive index.

Alcohol-Butadiene Plants Offered

The three alcohol-butadiene plants built by the government during the war at Louisville, Ky., Kobuta, Penna., and Institute, W. Va., to supply raw material for synthetic rubber production have been offered for sale or lease by the War Assets Administration. Offers have been invited to buy or lease all three plants, but only two offers will be accepted. This provision is said to be in line with recommendations of the Inter-Agency Policy Committee on Rubber and the Army-Navy Munitions Board which called for maintenance of a portion of the nation's synthetic rubber facilities to meet any future emergency. Which plant will be retained will be determined by the offers received. The alcohol-butadiene plants cost the government a total of $123,980,500 and have a combined capacity of 224,000 short tons of butadiene a year.

New Goodyear Appointments

Five new appointments in its shoe products division have been announced by the Goodyear Tire & Rubber Co., Akron. The new appointments include Frank Evans, formerly manager of factory sales and service at the company's shoe products factory in Windsor, Vt., as production manager of the entire shoe products division; William L. Hall, who was named production superintendent at the Windsor plant early this year, as plant manager at Windsor; and George G. Kerr, who has served as purchasing agent and superintendent at the Windsor plant since 1936, as sales manager of the company's shoe products division.

CANADIAN NEWS

The 1947 Canadian Chemical Conference and Annual General Meeting of the Chemical Institute of Canada will be held at the Banff Springs Hotel, in Banff, Alberta, June 8 to 11, inclusive. Tuesday, June 10, will be devoted to a number of technical sessions at which research and technical papers will be presented.

Canadian chemists and chemical engineers are invited to present papers at the Conference. Papers should preferably report on original research, although review papers will receive consideration. Authors are requested to submit titles, 100-word abstracts, 500-word outlines, and a short personal biography to the secretaries of the respective subject divisions on or before March 1.

The Council of the Institute has ruled that all scientific and technical papers presented before Regional and National meetings shall become the property of the Institute. Accordingly, authors of the accepted papers should submit two copies of the complete manuscript to J. W. Young, Banff Conference Committee Chairman of Technical Papers, 818 Nineteenth Ave., West, Calgary, Alberta, on or before April 30.

Authors desirous of reserving publication rights to papers must advise the Subject Chairman of the Division at the time of the submission of the paper. The chairman will then transmit this request to the Editorial Board of the Institute, who will make the final decision as to the disposition of the paper.

There is no reason to fear a general business recession of serious proportions in Canada during 1947, providing that industrial peace is maintained and the Canadian economy is not disrupted by strikes in the United States, according to a year-end statement issued by Greig B. Smith, manager of the Rubber Association of Canada. Given these conditions, the Canadian rubber industry as a whole is expected to operate at capacity or near capacity during the coming year. Highlights of Mr. Greig's statement follow herewith:

The tire industry anticipates a heavy demand for tires for oiginal equipment purposes throughout the year. Replacement sales should remain abnormally high until August or September, by which time referred consumer demand will probably be satisfied, and depleted dealer's inventories restored to normal. Export demand, which the industry will not be able to meet fully for some time, should then take up any slack arising from a drop in domestic replacement business.

The industrial products industry will be hard pressed to meet the demands made upon it as long as Canadian industry generally is operating at its present high level. In addition, export demand is expected to continue heavy throughout 1947. Similarly, the footwear industry will have to operate at capacity throughout the year to provide all the waterproof footwear, utility canvas footwear, and "style" canvas footwear which a prosperous Canadian public and numerous export markets desire to purchase.

The Canadian government has announced plans to relinquish control of allocation of natural rubber to manufacturers and specifications of rubber products on March 31, 1947. Canadian rubber companies already have been notified that they are free to purchase natural rubber in the world market. It is believed that Polymer Corp. will be able to operate successfully without restrictions on the use of natural rubber, and that rubber manufacturers will continue to use a considerable percentage of synthetic rubber, since natural rubber may be considerably short in 1947 and 1948. A growing demand for Canadian synthetic rubber abroad has been reported, and Canada has laid the ground for export sales to Latin America, Scandinavia, and many European countries. In 1946, Canada exported 15,000 tons of synthetic rubber.

Viceroy Manufacturing Co., Ltd., Toronto, Ontario, has declared a quarterly dividend of 7c a share, payable on March 15 to stockholders on record as of March 1.

Our attention has been called to the item in the "Canadian News" Section of our November, 1946, issue which referred to final settlement of the protracted labor difficulties which tied up ten rubber plants in the Province of Ontario, affecting over 10,000 workers. The statement was made in that item that the Dunlop Tire & Rubber Goods Co., Toronto, was one of the companies involved in the walkouts and subsequent settlements. We are glad to call to the attention of our readers the fact that Dunlop was not involved in the walkouts concerned and, in fact, that the company operated throughout the year of 1946 without any interruption due to labor difficulties.

In a recent address before the Engineering Institute of Canada in Montreal, Gordon R. Henderson, chief engineer of the Polymer Corp., Sarnia, Ontario, said that the future of the synthetic rubber industry is essentially one of economics. He felt that the economic value of maintaining synthetic rubber production in the world is well worth while if only to act as a stabilizer on the price of all rubber used.

Indicating that a large scale research program has been started, involving Sarnia plant personnel, research workers at various Canadian universities, rubber companies, and the National Research Council, Mr. Henderson declared that early in 1946 a pilot plant was completed for the preparation of GR-S, and that already valuable information in regard to this had been obtained. He added that the Polymer Corp. is the only plant which combines all operations to produce the major synthetic rubbers used in tire and tube manufacture, namely GR-S and Butyl.

The management of the government-owned Sarnia plant has been very active in trying to maintain full production, and a considerable portion of Sarnia production already has been exported to the Scandinavian countries, he asserted.

A wage increase of 10% for hourly paid employees, which is retroactive to December 1, 1946, has been put into effect by the Polymer Corp., Sarnia, Ontario. It also has been announced that working hours will be reduced from 44 to 40 hours a week effective June 1, 1947, without further changes in hourly rates.

Chicago Holds Christmas Party

Approximately 600 members, their wives, and guests, attended the annual Christmas Party of the Chicago Rubber Group, held at the Morrison Hotel in Chicago, Ill., on December 20. Devoid of technical discussion and devoted exclusively to entertainment, the party featured a cocktail hour, followed by dinner, distribution of prizes, and an excellent two-hour floor show of outstanding night club acts of the Chicago area. The distribution of prizes was made possible by donations received from the following concerns: Cordage, Inc., Florsheim Shoe Co., Herron Bros. & Meyer, Inland Rubber Corp., Montgomery Ward & Co., Sears Roebuck & Co., Servus Rubber Co., Shell Oil Co., and Witco Chemical Co. Each lady was presented with a Koroseal parasol. J. Frank Taylor and Ralph Anschuetz served as chairman and vice-chairman, respectively, of the program committee. Other members of the committee included Joe Zak, James P. Sheridan, Herbert F. Schwarz, Vincent Labrecht, and Alfred Stein.

Walsh Engineering Moves

The Walsh Engineering Co., formerly located at 35 Maiden Lane, New York City, has moved into a new plant at 76 Franklin Place, Summit, N. J. Considerably more manufacturing space is afforded at the new location. The company makes mechanical rubber goods, including rubber molds.

Announces New Appointments

Three new appointments have been announced by the U. S. Rubber Export Co., Inc. Fred S. Carpenter, who has been associated with U. S. Rubber since 1913 in various engineering, chemical, tire division, and export company positions, has been appointed director of manufacturing in charge of all factory activities for the export company, while Eugene J. Dailey, formerly assistant technical director at the Des Moines, Iowa, plant of U. S. Rubber, has been made assistant director of manufacturing, and Edward J. Higgins, who has served as assistant director of manufacturing with the export company, has been named to the newly-created position of director of development. Mr. Carpenter recently was a member of a survey party to Sumatra to inspect the company's rubber plantations.

Soapstone Clogging Eliminated

A method of preventing soapstone from accumulating in valves and control clocks on the presses on which inner tubes are vulcanized has been adopted by the B. F. Goodrich Co., Akron. The company had found that soapstone, drifting into the timing mechanism through a push button hole, had occasionally "stopped the clock" on a press, causing the press to open prematurely and ruin a tube. The trouble was eliminated by shortening and inserting one of the airplane dust-seal devices manufactured by the company around the space between the push-button and the control clock. The company's entire battery of tube presses has now been equipped with these "boots."

New Hycar Designation

In order to counteract the feeling by rubber manufacturers that the word "synthetic" carries the implication that rubber so named is inferior to natural rubber, the B. F. Goodrich Chemical Co., Cleveland, Ohio, has re-designated the nitrile rubber which it manufactures as Hycar American Rubber. The change is reported by the company to be in accordance with the current trend in the rubber and chemical industries to end usage of the word synthetic in reference to man-made materials which are in no way "imitations or substitutes" and for many purposes are superior to the natural product.

Absorbs Affiliated Research

Acme Backing Corporation, Meadow and Bogart Streets, Brooklyn 6, N.Y., has announced that it has incorporated into its expanded technical department all activities and personnel of Affiliated Research, Inc., formerly located at 239 East 44th St., New York City. In the future, all correspondence, orders, etc., for Affiliated Research, Inc., should be addressed to Acme Backing Corp.

Rossaloy Metallic Minerals

A new compounding material, called Rossaloy and described as "an alloy of powdered natural metallic minerals," has been developed and made available by the Ross-Gould Co., 309 No. 10th St., St. Louis 1, Mo. Compounds containing this new material are said to offer increased resistance to abrasion and compression. It is said to be compatible with most materials used in the compounding of rubber and plastics and to mix readily. Two types are available: Type No. 4 is not magnetic and is reported to reduce the electrical conductivity of the material it is mixed with, while Type No. 5 is magnetic and increases the electrical conductivity of low conductive materials.

Improved Rubber Mounting

An improved rubber mounting, which is said virtually to eliminate noise from the interior of railroad cars, is being produced by the U. S. Rubber Co. The mounting, placed between the truck and body of the car, intercepts noise produced by the wheels rolling over the steel rails. New sleepers and coaches equipped with the sound dampeners are said by company engineers to be as quiet as the average living room or office. The mounting is reported to be designed to withstand millions of flexings under weights as high as 70,000 pounds without distorting permanently from its original shape.

Get Assignments in Akron

Three officials of the Goodyear Tire & Rubber Co., who have served in Sydney, Australia, for many years, have returned to the United States for assignments in Akron. Alvin J. Slay, purchasing agent at the company's Australia plant for 20 years, has been assigned to special work in the Goodyear engineering division; Melville W. Mears, division superintendent at the Australia plant for 16 years, has been assigned to tube manufacturing, and Charles H. Maxwell, who was in charge of industrial products for the company in Australia for 16 years, has been made development manager of the company's Airfoam division.

Adopt Monoplex as Trade Name

Resinous Products & Chemical Co., 222 West Washington Square, Philadelphia 5, Penna., has announced that the name "Monoplex" is to be used hereafter to describe the series of monomeric plasticizers produced by the company. The increasing use of plasticizers by the rubber, coated fabrics, and coating fields was said to have made it desirable to select a name which would apply to the growing series of plasticizers and which would differentiate them from the Paraplexes, a series of polymeric resinous plasticizers made by the company. The new trade names in the series of monomeric plasticizers, with the old names in parentheses, are as follows: Monoplex DBS (Dibutyl Sebacate); Monoplex DOS (Dioctyl Sebacate); Monoplex DCP (Dicapryl Phthalate); and Monoplex 5 (Dibenzyl Sebacate).

Chicago to Meet February 14

Dr. Charles J. Mighton and E. L. Stangor, of the new Akron Rubber Laboratory of E. I. du Pont de Nemours & Co., will be the principal speakers at the next meeting of the Chicago Rubber Group, to be held at the Morrison Hotel in Chicago, Ill., on Friday evening, February 14. Dr. Mighton will deliver an address on "New Outlets for Rubber Through Latex," while Mr. Stangor will discuss "Backrinding of Molded Products." The talks will be similar in content to those delivered recently by the speakers before the Akron Rubber Group. As an added attraction, movies of the outstanding football games of the past season will be presented.

Neoprene Plant for Sale

The government's $43,000,000 synthetic rubber plant in Louisville, Ky., which was operated by E. I. du Pont de Nemours & Co., during the war, has been offered for sale or lease by the War Assets Administration. The plant, which has a rated capacity of 40,000 long tons of neoprene per year, consists of 12 buildings on a 222-acre land site, containing 500,000 square feet of industrial floor space. Included in the offer are all tanks, vessels, catalysts, monovinyl and chlorobutadiene manufacturing processes, as well as all necessary end product production facilities.

Wilmac D-X Processing Aid

A new compounding material for rubber, designed as an efficient milling and processing aid for highly loaded Silene compounds and similar stocks, has been introduced by the Wilmington Chemical Corp., 10 East 40th St., New York 16, N. Y. Called Wilmac D-X, the new compounding material is also recommended by the company as a substitute for stearic acid in various types of rubber compounds.

OBITUARIES

W. A. M. Vaughan

W. A. M. Vaughan, formerly vice-president and treasurer of the Seiberling Rubber Co., died at his home in Akron on December 24. He was 67 years old. Mr. Vaughan had been ill for nearly two years, and resigned from the Seiberling organization in December, 1945. Born in Kansas City, Mo., in 1879, he was educated in public schools and worked for a short time in the real estate business. In 1901 he went to Cuba to become a cashier at the National Bank of Cuba at Havana. He worked at various positions in the bank until 1914, when he returned to Kansas City.

In 1917, Mr. Vaughan joined the Goodyear Tire & Rubber Co., and was sent by F. A. Seiberling, then president of Goodyear, to Sumatra to superintend the opening of the first Goodyear rubber plantations there. He remained in Sumatra for three years, returning to the United States in 1919 to become treasurer of the Goodyear Tire & Rubber Co. of California. When F. A. Seiberling resigned as head of Goodyear in 1921 and founded the Seiberling Rubber Co., Mr. Vaughan joined him in the venture as treasurer of the company. He remained with Seiberling as treasurer until 1926 when he left to become executive vice-president of the Second National Bank of Akron. In 1932, Mr. Vaughan returned to Seiberling as treasurer, and remained there until his resignation last year. A widow and two daughters survive.

Stanley M. Elliott

Stanley M. Elliott, manager of agricultural tire sales for the Seiberling Rubber Co. and well known in tire industry circles, died on January 4 after a throat operation in Columbus, Ohio. A 1937 graduate of Ohio State University, Mr. Elliott had been an employee of the B. F. Goodrich Co. from 1939 until early in 1946, beginning as a test engineer and ending as manager of the tire and truck testing division. Prior to his employment at Goodrich, he had been a research worker at the University of Illinois. Mr. Elliott joined Seiberling as assistant manager of agricultural tire sales in March, 1946, and was made manager of the department in August. A widow survives.

Oran V. Dore

Oran V. Dore, a machine specialist for the Habirshaw Cable & Wire Co. for more than thirty years, died in the St. John's Riverside Hospital in Yonkers, N. Y., on December 22. He was sixty years old. A widow, two sons, and two daughters survive.

Frank H. Adams

Frank H. Adams, formerly treasurer of the Goodyear Tire & Rubber Co., died of a heart attack in Santa Barbara, Calif., on December 26, one day before his 81st birthday. Mr. Adams was born in Middlebury, Ohio, in 1865. Following his graduation from the Massachusetts Institute of Technology, he worked as a mining engineer in Mexico. He returned to the United States to become cashier of the old First National Bank in Akron and joined Goodyear in 1909. In 1917 Mr. Adams retired as treasurer of Goodyear but continued as a director until 1921. He joined the Akron Metropolitan Park Board in 1930, serving with F. A. Seiberling and the late E. D. Eckroad, was a charter member of the University Club and the Portage Country Club, and was active in Boy Scout work. A widow and stepson survive.

Ernest H. Jeffords

Ernest H. Jeffords, who retired early in 1946 as general manager of the General Asbestos & Rubber Division of Raybestos-Manhattan, Inc., and as a director of the parent company, died at his home in Charleston, S. C., on December 12 at the age of 71. Mr. Jeffords was graduated from the Military College of South Carolina (The Citadel) in 1894 and worked for Charleston banks and business houses before taking his first job as bookkeeper with the General Asbestos & Rubber Co. in 1917. In this position, he installed the company's first cost system. In 1927 he became vice-president and general manager of the company which in 1929 merged with the Manhattan Rubber Manufacturing Co. and other companies to form Raybestos-Manhattan, Inc. He was a Mason and a member of the Knights of Pythias.

Frank H. Swayze

Frank H. Swayze, president of the Whitney Blake Co., Hamden, Conn., manufacturer of insulated wire, died in Phoenix, Arizona, on January 4. His age was 68. Mr. Swayze was formerly president of the New Haven Section of the National Metal Trades Association and also of the New Haven Manufacturers Association. A widow survives.

Angel Urraza

Angel Urraza, president and a director of Goodrich Euzkadi, tire manufacturers in Mexico, died in Mexico City, Mexico, on December 11. He was 56 years old. Mr. Urraza was considered one of the most important Spanish industrialists in Mexico.

Maurice L. Allard

Maurice L. Allard, technical superintendent at the Buffalo, N. Y., laboratory of the U.S. Rubber Reclaiming Co. for the past twenty years, died on December 16 after a prolonged illness. He was 65 years old. Born in Brussels, Belgium, in 1881, Mr. Allard came to Canada in 1900, to embark on his career as a rubber technologist under the tutelage of Dr. Harold Van der Linde at the Gutta Percha Rubber Co., Ltd., in Toronto. Supplementing his practical experience with studies at the University of Toronto, he became an expert in compounding and factory practice.

The late Mr. Allard

In 1910, Dr. Van der Linde formed the Century Plainfield Tire Co. in Plainfield, N. J., where Mr. Allard assisted in the development of revolutionary tire designs, a number of which have been incorporated in present day manufacturing. In 1914, Mr. Allard joined the staff of the Dunlop organization in Toronto and shortly was sent on a mission to England, and thence to the Far East, where he traveled extensively through the plantations of Malaya and the islands. On this trip, the ship on which he was traveling was torpedoed and sunk in the Mediterranean, an experience from which he emerged uninjured.

His experience on the plantations stood him in good stead in subsequent work at Dunlop, where he remained as assistant plant superintendent for some years. He returned to Belgium for a brief stay in 1920, and later that year rejoined the Gutta Percha & Rubber Co. as superintendent of the Planning Department, where he remained for six years. In 1926 he became associated with the U. S. Rubber Reclaiming Co. in the position which he held at the time of his death.

Charles B. Thwing

Dr. Charles B. Thwing, president of the Thwing-Albert Instrument Co., Philadelphia, Penna., died at his home in Philadelphia on December 12 at the age of 86. A graduate of Northwestern University, Dr. Thwing also studied at the University of Bonn in Germany. He was the author of a book on physics and the inventor of an electrical pyrometer. The author of "Thwing's Law," which deals with the inductivity of electricity in metals, he also contributed articles to many scientific magazines. Dr. Thwing was a member of the Franklin Institute, the Optical Society of America, and the American Ceramics Society. Two daughters and two sons survive.

Charles E. Stokes, Sr.

Charles E. Stokes, Sr., a member of a family that has been active in the rubber manufacturing business in Trenton, N. J., for the last sixty years, died on December 25 at the Graduate Hospital in Philadelphia, Penna., at the age of 78. Mr. Stokes was president of the Home Rubber Co. and vice-president of the General & Chemical Supply Co. at his death. He was a former president of the Trenton Club and the Trenton Country Club. A daughter and son survive.

Expansion Program Underway

Shell Chemical Corp. has announced that a $2,500,000 expansion program which is expected to increase its capacity to produce methyl ethyl ketone and secondary butyl alcohol by 150% is well underway. The expansion program is said to be directed chiefly toward the installation of facilities for the production of these chemicals at the company's Houston, Texas, plant. Maximum production is scheduled to be attained during the third quarter of 1947.

New DuPont Technical Reports

A number of new technical bulletins have been made available in recent weeks by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. These bulletins include: *Ela: A New Elastomer Lubricating Agent (BL-210); Copper Inhibitor X-872-L (BL-216);* and *Compounding of Neoprene for High Recovery After Compression at Low Temperatures (BL-218).* Copies are available upon request to the company.

Directors Approve Name Change

Directors of the National Oil Products Co., Harrison, N. J., have voted to change the organization's name to Nopco Chemical Co., subject to approval of stockholders at their annual meeting in March. The change was decided upon because the company is a chemical manufacturer and not an oil company, as the former name implied.

Rubber Safety Figures

The rubber industry continues to rank high from the standpoint of safety. According to latest figures, the industrial accident average in the third quarter of 1946 was 18.1 disabling injuries for each million employee-hours worked. In the same period the rate was 10.2 for the boot and shoe industry and 13.8 in the tire and tube field. The synthetic rubber industry, which uses hazardous materials and processes, rates as the country's safest industry. Its cumulative record at the end of the third quarter of 1946 was only 2.8.

Japanese Reparations Report

Removal of all plants devoted to the manufacture of synthetic rubber in Japan was one of the recommendations contained in a report on the exaction of reparations from Japan, submitted to President Truman on November 16 by Edwin W. Pauley, United States reparations representative with the rank of Ambassador. The report was compiled after exhaustive studies of Japanese industries during the past year by a mission of American experts under Mr. Pauley's direction. The recommendations in the report are expected to be the basis of United States policy for discussion with the other Allies. Several industries were proposed for immunity from reparations, among them being the rubber processing industry.

New Heavy Duty Truck Tire

A new tire using rayon throughout has been introduced by the B. F. Goodrich Co., Akron, for heavy duty commercial trucks. Manufactured in sizes ranging from 6.00-16 through 7.50-16, the tire is said to outwear prewar tires made for the same service. One of the principal features of the tire's construction is its wider, flatter tread which puts more tractive rubber on the road and which is said to wear more evenly, resulting in longer mileage. The rayon cord used in the tire is weftless, so that there are no cross threads to produce tension.

To Construct Vinylite Units

Carbide & Carbon Chemicals Corp. has announced that in the near future it will begin construction of units for the manufacture of Vinylite resins as an addition to its plant at Texas City, Texas. These new facilities will be erected on land owned by the company west of its present location between LaMarque and Texas City, and will form part of a general building program involving an expenditure of approximately $15,000,000. The company expects that this program will require from two to three years for completion.

William B. Gold

William B. Gold, purchasing agent of the Electric Storage Battery Co., Philadelphia, Penna., died suddenly on December 15 at his home in Germantown, Penna. His age was 66. Mr. Gold joined the battery concern in 1900 and became purchasing agent thirteen years later. He was one of the organizers of the Philadelphia Association of Purchasing Agents and served as its president and a director for several years. He was also a founder of the National Association of Purchasing Agents, serving as its vice-president and a director. Mr. Gold was also a director of the Warren Ehret Co. A widow and son survive.

George S. Knapp

George S. Knapp, general sales manager of the Pigment Color Division of the Imperial Paper & Color Corp., died on January 4 at the age of 56. Born in Pittsburgh, Penna., Mr. Knapp joined Imperial in 1919 in Cleveland, Ohio, and was assigned to the company's home office in Glens Falls, N. Y., in 1929.

To Handle Federal Tire Sales

Tidewater Associated Oil Co. has contracted to take over the exclusive sales of the entire line of passenger car, truck, industrial, and agricultural tires and tubes manufactured by the Federal Tires Division of the U. S. Rubber Co., in all territories in which the three sales divisions of the oil company's national organization operate. The agreement is said to provide Tidewater Oil with one of the most complete lines of tires and tubes sold by any oil company under its own or private brand name.

Riesing Addresses Ford Group

E. F. "Tom" Riesing, of the Detroit office of the Firestone Industrial Products Co., delivered an address on "Rubber and Automotive Production" before the Engineering Training Group of the Ford Motor Co., at River Rouge, Mich., on December 23. The talk was part of a series of six in a plastic symposium. As part of his talk, Mr. Riesing demonstrated the Joule Effect, using the Wiegand Pendulum.

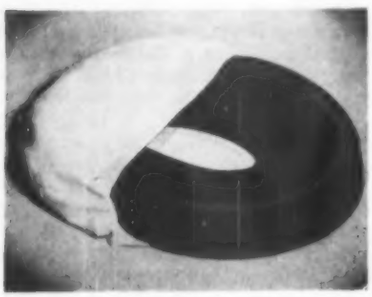
Acquires Synthetic Equipment

Machinery used for the production of GR-S at the Louisville, Kentucky, copolymer plant, operated for the government by the B. F. Goodrich Co. during the war, was recently sold to the Goodrich company. Valued at $87,600, part of the equipment will be used for the manufacture of Geon. The plant, recently acquired from the War Assets Administration by Goodrich, is being reconverted to the manufacture of Geon.

NEW RUBBER GOODS

Profex Invalid Ring Cushion

A shape-conforming invalid ring cushion which features an exclusive form-fitting concave shape, has been introduced



by Professional Specialties, Inc., 1825 Chouteau Ave., St. Louis 3, Mo. Called the Profex Invalid Ring Cushion, the new item is made of foam rubber, and comes equipped with a removable preshrunk white duck cover, as indicated in the accompanying illustration. The cushion is 14 inches by 16 inches by 2½ inches in size.

"All-Weather" Fire Hose

Five grades of a new line of water-repellent and mildew-resistant fire hose is being manufactured exclusively for the American-LaFrance-Foamite Corp., Elmira, N. Y., by the Goodyear Tire & Rubber Co., Akron. Known as the "All-Weather" Fire Hose, the hose is double jacketed and is said to embody a new and important development in jacket design. The edges of the hose are reinforced with special high tension cable cord yarns which are reported to give the greatest possible wear at the points where it is most needed. Both hose jackets of this white "All-Weather" line are water-repellent.

American Songster Toy

Production of the American Songster, a whistle toy manufactured in the shape of a bird, which was curtailed during the

war, has been resumed by the Chicago Musical Instrument Co., 30 East Adams St., Chicago 3, Ill. Available in gay color combinations, the toy has a rubber body and a plastic mouthpiece. The toy is packaged on a card which gives complete instructions for imitating bird calls and whistles.

Road Lug Truck Tires

A new line of truck tires, known as the Road Lug, for combination off-the-road and highway service, has been introduced by the Goodyear Tire & Rubber Co., Akron. Production has begun of the Road Lug tire in sizes 7.00-20 through 12.00-24, and the company ultimately plans to produce sizes 13.00-24 and 14.00-24. The tires are constructed with a rayon cord carcass, tread and sidewalls with natural rubber content equal to prewar tires of the same size, extra heavy layers of cushion rubber between plies, and an extra heavy rayon breaker. They

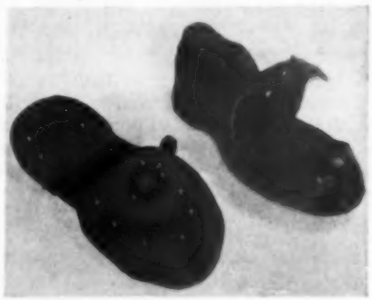
are said to be particularly suitable for use in such services as logging, quarrying, and strip mining under conditions where heavy loads must be hauled over rocky and stump obstructed roads to surfaced highways for long hauls to ultimate destination. The company claims that the tire is capable of resisting cutting and bruising, providing traction in soggy terrain, and delivering exceptional mileage on improved highways.

"Neolay" Aircraft Wire

U. S. Rubber Co. has introduced a new, light aircraft wire, known as "Neolay," which is said to reduce fire hazard considerably in airplanes. The flameproof insulation consists of a layer of glass fiber to insure circuit integrity and a fire-resistant synthetic rubber applied by a special dipping process developed by the company. The over-all diameter of the wire is reported as 15% smaller than conventional aircraft wire. According to the company, recent tests show the wire to be highly resistant to oil, chemicals, mildew, and fungus.

Skid-Proof Rubber Footwear

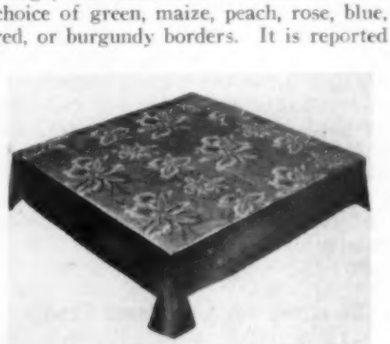
As part of its wartime program, the National Research Laboratories, Ottawa, Canada, developed anti-skid soles. Intended primarily for use on board ships under icy conditions, the soles are also adaptable for general pedestrian use. The novelty of the soles is essentially the pro-



vision in the sole of rubber embedded spikes, the spikes being held in a pad of soft rubber or other resilient material for the purpose of preventing the packing of ice or snow between them. Although sandal type rubbers (as illustrated) can be constructed, the original trials were made with ordinary rubbers to the bottoms of which the anti-skid soles were vulcanized. The sole assembly, in brief, consists of a layer of plywood, a layer of holland cloth, uncured rubber sheet, a piece of thin canvas impregnated with rubber cement, and another layer of uncured rubber. Before the latter layer is applied, the nails are hammered into place. The entire assembly is vulcanized, and soles cut out of the vulcanized sheet, which are subsequently attached to the bottom of the rubbers. The spikes protrude less than ⅛th of an inch.

Yardley Plastic Tablecloth

A new plastic tablecloth, which is said to be ideally suited for every type of table, is being manufactured by the Fabricated Products Co., 345 West Hubbard St., Chicago 10, Ill. Featuring a printed design, the tablecloth is available in a choice of green, maize, peach, rose, blue, red, or burgundy borders. It is reported



to be waterproof, mildewproof, completely non-porous, and to wash off easily. It can be folded away, yet wrinkles will shake out quickly so that the cloth is ready for use. Also, according to the manufacturer, it will not crack, peel, nor retain odors.

NEW EQUIPMENT

Farrel-Birmingham 3100-Ton Belt Press

Featuring new design and simplified construction, and planned for the cutting of production costs in the manufacture of rubber-impregnated belt stock of various widths and gauges, a new 60″ x 30′0″ platen press has been introduced by the Farrel- Birmingham Co., Inc., Ansonia, Conn. Built for heavy duty, the press exerts a pressure of 280 lbs. per square inch on

the platen areas, or a total load of approximately 3100 tons, by means of eight 22-inch diameter rams operating under hydraulic pressure of 2,000 lbs. per square inch.

The most important design innovation is in the construction of the top crosshead and reduced number of cylinders. Cast in two sections each weighing 43,000 pounds, the crosshead, by its mass and design, permits wider center placement of the cylinders, which are larger and less than half the number required in a similar type press with individual top crosshead for each cylinder. This simplified construction reduces upkeep, as fewer cylinders mean less moving and wearing parts, with a consequent reduction of maintenance items such as replacement of worn packings.

Equipment includes polished steel upper and lower platens, 3¼″ thick, which are drilled for steam circulation. An edging device of new design, fitted to the bottom platen with its actuating mechanism outside the platen area, permits curing belts of approximately the full platen width. Another feature which contributes to the operating efficiency of the press is the positive equalizing device connected with the follower crosshead, which keeps the bottom platen at a true level when the press is opening or closing.

To prevent endwise movement, the follower platen is secured at the center by guides located on one tie rod on each side. Because the platen is held at the center only, it is free to expand in both directions. Other guides on a pair of tie rods near each end of the press prevent sidewise movement. The design of the stretcher and clamp unit allows the stretcher reaction load to be absorbed and balanced by the middle and top members of the press structure.

To assure necessary strength and rigidity, the principal parts of the press, with the exception of the forged steel tie rods, are made of Meehanite, a metal of superior physical qualities and high strength. These include the top, bottom and moving crossheads which are proportioned for maximum deflection of .005″.

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•

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Scorching during calendering can be avoided. Determination of the surface temperatures of still or moving rolls is simple with the CAMBRIDGE Roll Pyrometer. This accurate, rugged, quick-acting instrument is so easy to use that workmen do use it. The roll model is for checking surface temperature of still or moving rolls. The needle type for within-the-mass temperature. The mold type for surface temperature of mold cavities. Send for bulletin 194-SA.

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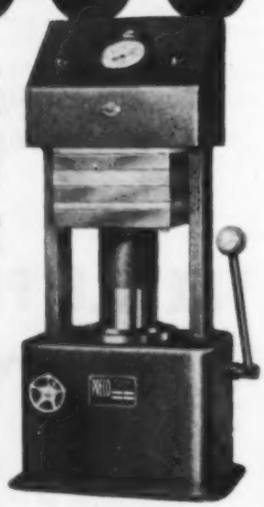
POUNDS PRESSURE WITH THIS PRECO HYDRAULIC PRESS



THIS is a bench type hand-operated hydraulic press. The two-stage pump develops 40,000 pounds pressure on 8" x 8" electrically heated, water-cooled platens. 8¾" x 12" platens are also available. The pressure and temperature heat controls are extremely accurate. Maximum opening between platens is 8 inches.
You can use this press for production . . . for laboratory control . . . or for experimental work. Tell us your proposed application. Complete data and specifications will be promptly supplied. Dealers in all principal cities.

PRECO INCORPORATED
964 East 61st Street Los Angeles 1, California

Beken Duplex Mixer

The Beken Duplex Mixer, a heavy-duty mixer which finds special application in the rubber and plastics industries, especially for the handling of polyvinyl chloride among the plastics, is now being produced and delivered in the United States by the Bramley Machinery Corp., 15 Park Row, New York 7, N. Y. Originated in Great Britain, the American model is said to be a streamlined and greatly improved machine.

The Beken mixer works on an entirely new principle of mixing. Overlapping paddles rotate at two-to-one speeds and squeeze the rubber or other material between the blades as the paddles overtake each other. This action is said to result in extremely rapid production with comparatively low power requirement. Another feature of the mixer is rapid heat transfer where either heating or cooling is required. The unique shape of the paddles draws material away from the walls of the trough thus facilitating heat transfer.

Beken mixers are now being used for the production of rubber cements, coating compounds, aqueous dispersions of rubber, pigment dispersions, etc. The special squeezing action is reported to be effective in handling both natural and synthetic rubbers and the rubber-like plastics, such as the vinyl polymers.

In the preparation of rubber cements, the machine rapidly breaks down the rubber and produces smooth flowing solutions with complete adsorption of gelatinous particles. In the dispersion of pigments, dispersion is reported to be so complete that there are no agglomerates left in the finished mix. Standard models have capacities ranging from 6 to 150 gallons. Models with still larger capacities can be furnished.

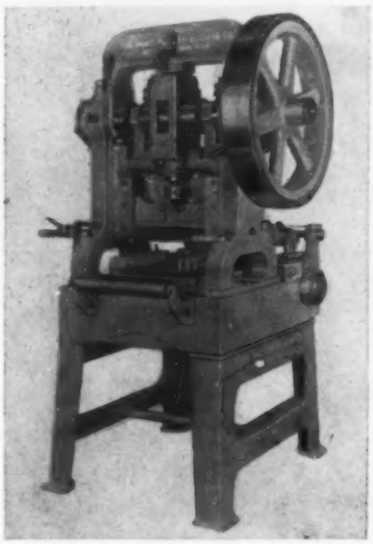
BUTENE POLYMERS

for data, write to

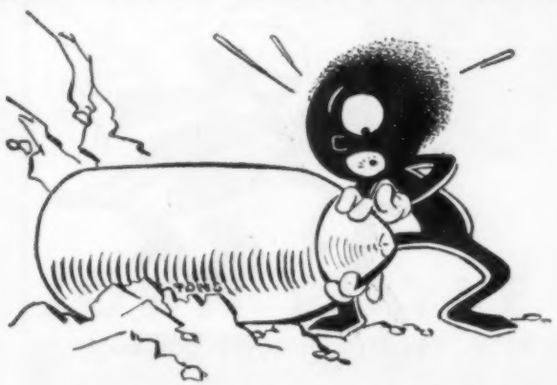
ADVANCE SOLVENTS & CHEMICAL CORPORATION
245 FIFTH AVENUE NEW YORK 16, N. Y.

Coulter Rubber Cutting Machines

The new rubber cutting machines for continuous volumetric control and stripping for heels, soles and taps, and other molded products, have been developed and introduced by the James Coulter Machine Co., Bridgeport, Conn. The two new models, known as A2



and A3, will cut rubber with or across the stock grain, either singular or in multiples. Model A2 (illustrated) is intended for cutting multiple heels, half or full soles, with stock grain, while Model A3 is for cutting multiple heels and taps with or across stock grain. Model A1, long in use in the rubber field, is used for cutting heels in long or short runs. All of the Coulter cutting machines are complete with volumetric plunger compressors so that when the blank is cut uniformity is assured, thus holding the overflow in the molds to a minimum. The return of hot scrap saves power cost of remilling and uses up a larger portion of the batch or mix. The removal and replacing of dies takes only three to five minutes, while adjusting length of feed takes approximately the same time.



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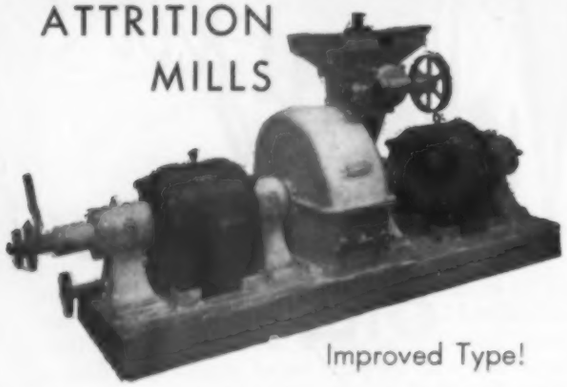

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Attrition Mills for grinding all types of material. Adjustable for coarse or fine grinds. Hard iron grinding plates. Capacities to your requirements. Robinson Processing Equipment is designed by engineers whose reputation is founded upon doing things right. Literature available. Inquiries invited.

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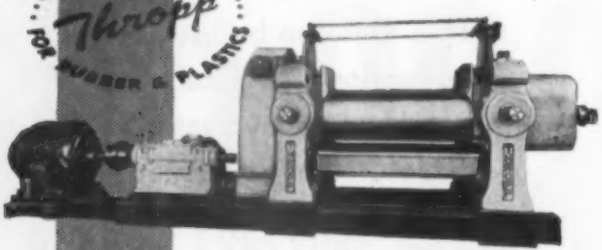

New Hi-Speed MILLS

22" & 22"x60" Extra Heavy Duty

Extra Heavy Duty Individual Motor Driven Mill with 15" diameter journals, having 150 H.P. enclosed herringbone gear drive. Machine is equipped with solid bronze lined bearings having oil closure seals on side of the boxes facing the rolls to prevent oil contamination of the stock. Steel cut connecting gears and Johnson Rotary Joints. Manzel mechanical lubricator and new style guides bored to fit the rolls. This is just one of the many new Thropp precision built mills designed to speed up post war production.

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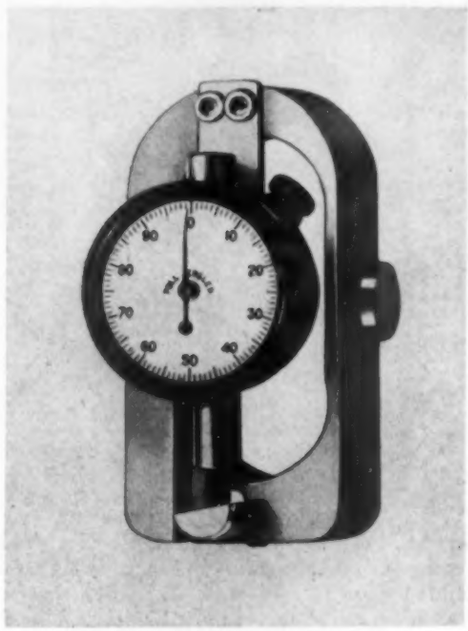
Thropp

WM. R. THROPP & SONS CO.
Trenton, N. J.

Dillon Mechanical Pressure Gauge

W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44, Ill., has introduced a new mechanical pressure gauge to indicate pressures in mechanical assemblies. The unit can be used to check pressure between moving rollers, pressure between platens in all types of presses, tension in a moving thread, twine, or wire, etc. It has been designed compactly so that it

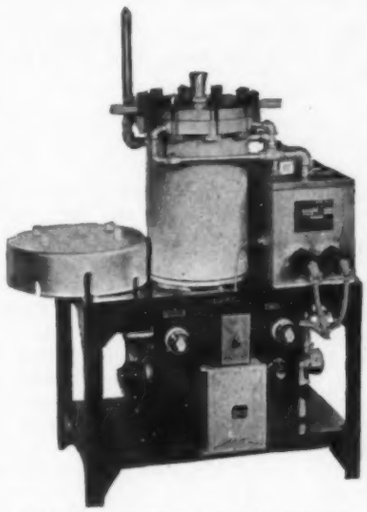


can fit into "tight" spots heretofore inaccessible yet where pressures of static or moving parts must be measured. The instrument is also said to work in vises, between all types of clamps, and to be convertible into a miniature testing machine. Unaffected by extreme temperature changes, it can be used indoors as well as outdoors. In cases where the operator can not get close enough to read the dial, the company supplies remote repeater stations that can be read up to 500 feet or more. The pressure gauge is available in numerous capacities and weights.

FOR GOOD ABRASION RESISTANCE USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 390

THE LABORATORY IS THE SOURCE OF EFFICIENCY IN MANUFACTURING . . . . .



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We manufacture various types of Rubber Laboratory Equipment

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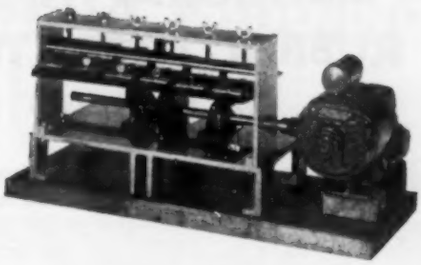
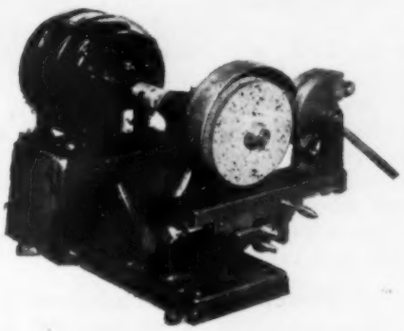


ROSS RUBBER FLEXING MACHINE.



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for 1940-1941

THIS new bibliography, covering the years 1940 and 1941, is the Fifth in a series inaugurated by RUBBER AGE with the edition covering the year 1935. Succeeding editions covered 1936, 1937 and 1938-1939.

The series was dropped during the war but it has now been taken over by the Division of Rubber Chemistry, American Chemical Society. The Division appointed a Bibliography Committee in 1943, consisting of Messrs. C. C. Davis, M. E. Lerner, C. W. Christensen and Dr. John McGavack, Chairman. After the committee made an investigation and found that rubber technologists in general favored the continuation of the bibliography, the Division authorized the committee to proceed with the compilation and publication of an edition covering 1940 and 1941.

The present volume is the result of the efforts of the committee. The size, 296 pages, is evidence of the large amount of work published during the period covered by the volume and of the diligence of the Committee in compiling and abstracting these published results. Not only have all references on rubber appearing in hundreds of technical journals been compiled but references to hundreds of patents relating to rubber and rubber compounds are included in each reference, a feature not found in earlier editions.

In a statement appearing in the foreword, the committee stated, "We feel this book will meet the need of rubber chemists in their usual day to day job." Research engineers, librarians and others will also find this book an invaluable source of information.

It is expected that succeeding volumes will also cover 2-year periods until it is possible to issue annual editions so that they will appear within a comparatively few months after the end of each year.

NOTE: One copy of this book has been sent, without charge, to each member of the Division of Rubber Chemistry, A. C. S. Additional copies may be purchased as noted below.

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REVIEWS

BOOKS

Seen from E.A. By Herbert Feis. Published by Alfred A. Knopf, Inc., 501 Madison Ave., New York 22, N. Y. 5 x 7¼ in. 320 pp. $2.75.

Based on a series of lectures delivered by the author at Indiana University in 1945 under the auspices of the Patten Foundation, this book is really three books in one. It is the story of three international episodes immediately preceding the war, and continuing into the war, reflecting America's desperate race to secure stockpiles of rubber and oil. The three episodes are: (1) Rubber Before Pearl Harbor; (2) The Government Gives Attention to the Oil of the Middle East; and (3) Oil for Italy: A Study in the Decay of International Trust.

Members of the rubber industry will of course be primarily interested in the episode on rubber traced by Mr. Feis. How stockpiles of this most strategic material were achieved in the face of official indifference, private monopoly, and budgetary penny-pinching makes an interesting narrative. During this period Mr. Feis was associated with the State Department as an adviser on International economic affairs, at one point acting as head of the Interdepartmental Committee of Strategic and Critical Raw Materials. (The "E.A." in the title of the book is an abbreviation for economic affairs.) In this capacity, he was closely associated with the international aspects of the rubber situation.

The author holds no briefs for the buyer or the sellers during the early stockpiling efforts, criticizing both sides for their thinking and doing. He employs two novel mannerisms in telling his story, namely, although he was in the center of the events related he uses the third person throughout the book, and refers to most of the Americans who appear in the narrative by their official titles rather than by their given names.

•

The Industrial Republic. By P. W. Litchfield. Published by the Corday & Gross Co., Cleveland, Ohio. 6 x 9 in. 224 pp. $4.00.

Aptly subtitled "Reflections of an Industrial Lieutenant," this book, by the chairman of the board of the Goodyear Tire & Rubber Co., one of the outstanding authorities of the rubber manufacturing industry, presents views of labor, capital and consumer gained through a half century of industrial experience. Its arrangement is somewhat unusual in that the first of its four sections is a reprint of a book on the same subject which Mr. Litchfield wrote in 1919 at the conclusion of World War I, in which he outlined the principles of what eventually became the Goodyear Industrial Assembly. The second section treats with the record of the Assembly, which passed out of the picture when, under the Wagner Act, it was classified as a "company union." The third section deals with the impact of modern unionism on the Goodyear company, while the fourth and concluding section deals with wages, profits, taxes, government controls, etc., and offers the outline of a plan for American production—industrial democracy.

•

Standards on Textile Materials. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 504 pp. $4.00.

Compiled by the A.S.T.M. Committee D-13 on Textile Materials, this latest edition of "Standards on Textile Materials" includes in their latest form 86 specifications, test methods and tolerances covering a wide range of textile materials. Information is also included on the basic properties of fibers, tables on yarn number conversion and relative humidity, and several proposed tests.

The Rubber Industry. (Revised). By Josephine Perry. Published by Longmans, Green & Co., Inc., 55 Fifth Ave., New York 3, N. Y. 6 x 8 in. 128 pp. $2.00.

The present volume of this work, published as part of the "America at Work" series, is a new, enlarged and completely revised edition of the author's earlier volume on the rubber industry (1941). Like the first edition, it is a brief account of the growth and development of the sprawling rubber industry, but this time adds the story of the American development of synthetic rubber to meet the country's need for an indispensable raw material. The importance of rubber research is also stressed in the present volume. Intended for students and others wishing to familiarize themselves with the rubber field, it contains brief data on the manufacture of various rubber products, including tires, footwear, mechanical goods, and latex applications.

•

Industrial Research Laboratories of the United States. Compiled by Callie Hull. Published by the National Research Council, National Academy of Sciences, Washington, D. C. 6¾ x 9¾ in. 415 pp.

This is the eighth edition of this directory which furnishes valuable information on the industrial research laboratories of the United States, including consulting research laboratories. An appendix has been included for the first time in the present edition, listing colleges and universities which offer research service to industry. The data included is fresh and up-to-date, as no unrevised material is included. The laboratories are listed in alphabetical order, with information furnished on personnel and services rendered. Three special indexes are included, i.e., a geographical distribution of laboratories, a personnel index, and a subject index of research activities.

•

Plastics Molds (Third Edition). By Gordon B. Thayer. Published by Huebner Publications, 2460 Fairmount Boulevard, Cleveland 6, Ohio. 6 x 9 in. 272 pp. $5.00.

Double the size of the second edition (1944), which was an enlargement of the first edition (1941), this third edition of Mr. Thayer's book has been completely re-written and brought up to date. Like previous editions, it treats with the design, manufacture and use of molds. A rather complete chapter on "Estimating Plastics Molds" is included for the first time, while the "Nomenclature of Plastics Molding," which has proved to be a popular feature, has again been enlarged. Once again Mr. Thayer has met the problem of minutely describing complicated mechanical procedures, keeping his descriptions both understandable and easy to read.

•

Pitfalls to Avoid in Labor Arbitration. Published by National Foremen's Institute, Deep River, Conn. 9¼ x 11½ in. 56 pp. Looseleaf. $5.00.

This is a practical guide for writing labor arbitration clauses and handling arbitration cases, written without the use of legal terminology. It is intended to give a working knowledge of arbitration methods quickly covering such subjects as the how and why of arbitration, types of arbitrations, organization of arbitration, and general procedure. A seven point program for achieving the best results is included.

•

Chemical Engineering Catalog: 1946-1947. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 8 x 11 in. 1768 pp.

The latest edition of the process industries' catalog is the thirty-first annual edition to be issued. It contains the latest catalogs of innumerable manufacturers of equipment and supplies, as well as chemicals and materials, and includes, as usual, a comprehensive trade name index and a technical and scientific books section. The trade name index has been completely revised and brought up-todate.

Even tough unloaders come out easily with

DC Mold Release Emulsion *No. 35*

The Dow Corning Silicone Release Agent

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B. F. Goodrich and other enterprising rubber companies are using DC Mold Release Emulsion No. 35.

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Silicones, which have the same type of inorganic framework found in glass, do not decompose to form carbon deposits. They withstand temperatures of 500° F. for a long time. Hundreds of hours at vulcanizing temperatures will not break them down.

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DC Mold Release Emulsion No. 35 forms a silicone film which keeps synthetic rubber or dirt accidentally introduced into the mold from sticking to mold surfaces.

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Concentrations ranging from 50 to 150 parts of water to 1 part of the Emulsion are applied by spraying with conventional equipment. Even inexperienced workers get good results because the amount to be applied is not critical.

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Notre Caoutchouc d'Indochine. (Our Indo-China Rubber). Issued by Institut Francais du Caoutchouc, 42 Rue Scheffer, Paris, France. 8¼ x 10¼ in. 36 pp. (In French.)

Published under the auspices of La Federation Nationale des Producteurs de Caoutchouc, Gommes et Resines, in cooperation with L'Institut Francais du Caoutchouc, this booklet, as indicated by its title, covers the cultivation of rubber in Indo-China. It discusses the location of rubber plantations in the country, the early trials and tribulations of rubber cultivation, and some of the lessons learned as a result of actual accomplishment. The effect of the war on the rubber industry in Indo-China is also discussed, as well as the future potential of the country. In the latter regard, considerable space is devoted to a discussion of the applications of rubber in various fields, including home and industry.

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Phillips Hydrocarbons: 1946. Chemical Products Dept., Phillips Petroleum Co., Bartlesville, Oklahoma. 5 x 8 in. 116 pp.

This latest edition of the Phillips catalog, which is actually an up-to-date hydrocarbon reference manual, has been completely revised. Of value to all those concerned with hydrocarbon problems, it is divided into three sections for ready reference. The first section contains a description of the research grade hydrocarbons now available, the second describes all other hydrocarbons available from the company in various qualities, and the third contains valuable technical data, including specifications, impurities and typical properties of various hydrocarbons.

•

The ABC of Synchronous Motor Control. (Vol. 7, No. 3). Electric Machinery Manufacturing Co., Minneapolis 13, Minn. 8½ x 11 in. 20 pp.

Containing more than 45 diagrams and photographs, this booklet tells the story of modern synchronous motor control. It shows how the synchronous motor starts and how polarized field frequency control works, and describes the magnetic controls of full voltage, reduced voltage, part winding, and high-fuse combination. A spread-out connection diagram and a selection chart for control are also included.

FOR EASY PROCESSING USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 390

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, JAN. 9, 1947

Natural Rubber

BASED on the latest report of the Civilian Production Administration made to the President, and rumors emanating in general from Washington, it now seems definite that the government will continue the public purchase of natural rubber well into the new year. There was some hope that free trading would be restored by the end of the current month, but now it is doubtful whether any action on this score will be taken until Congress takes some action on the continuation of allocations and end specifications of rubber goods after March 31.

According to the latest reports in rubber trade circles, the government is having some difficulty in securing 50,000 tons of natural rubber in the Far East for shipment this month. The government's major difficulty is said to be the procurement of rubber at a fixed price of 20¼ cents per pound in an open and fluctuating market. Best grades of natural rubber are reported to be selling at slightly higher prices for shipment to other countries, with the result that the United States stock-figure for March 31 may have to be revised downward.

Although final figures have not as yet been made public, it is believed that Malaya has fallen short of the special 200,000 tons it was to have shipped to the United States in the last quarter of 1946, which means that any balance due will have to be supplied by Great Britain from London stocks. Malayan exports during December reached 69,163 long tons, of which 43,061 tons went to the United States. December exports were 10,487 tons under those of the previous month.

Prices shown below are those established by the Office of Rubber Reserve:

Plantations—

Ribbed Smoked Sheets, No. 1X	.22½
Thick Pale Latex Crepe, No. 1X	.22½
Thin Pale Latex Crepe, No. 1X	.22½
Thick Brown Crepe, No. 1X	.21⅜
Thin Brown Crepe, No. 1X	.21⅜
Thick Remilled Blankets, No. 1	.21⅜
Thin Brown Remilled Crepe, No. 1	.21¼
Rolled Brown or Flat Bark	.18
Smoked Blankets, No. 1	.21⅛
Claro Brand 1XRSS	.22½
Sole Crepe Trimmings	.22
R.C.M.A. Wtmkd. Crepe No. 16	.26⅛
Sole Crepe	.22½

Wild—

Uncut Fines, Crude	.15
Cut Fines, Crude	.15½
Cut Fines, Washed & Dried	.22½
Islands Fine, Crude	.14⅜
Weak Fine, Crude	.14⅜
Cameta, Crude	.09¾
Upriver Coarse, Crude	.12⅜
Manicoba, Crude	.12¼
Caucho Ball, Crude	.11⅜
Panama Slab, Crude	.09⅜
Mangabiera, Crude	.08½
Cameroons, Crude	.16¼

Guayule—

Carload Lots	.17½
Less-than-Carload Lots	.18

Latex—

Normal, Tank Car Lots	.26
Normal, Carload Drums	.28¼
Normal, Less than 1 Drum	.35¼
Centrifuged, Tank Car Lots	.27½
Centrifuged, Carload Drums	.29¼
Centrifuged, Less than 1 Drum	.36½

Scrap Rubber

The scrap rubber market is reported to be in a somewhat confused state at the moment, with little actual demand for other than inner tube grades. It seems evident that some price differential will have to be established between various natural and synthetic rubber stocks, and some action in this regard is expected to be taken in the very near future. In the meantime, reclaimers are again reluctant to accept deliveries of mixed stocks, a problem which scrap dealers have been faced with for months. Export demand, however, particularly from the Far East, still continues strong, especially for tire scrap which is used to make shoes for coolies. Credit difficulties enter into this export picture, as well as that of shipping space, but substantial shipments are still being made. Current quotations on various grades of scrap follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	50.00
No. 1 truck peelings	ton	50.00
No. 2 passenger tubes	lb.	.07½
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06½
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07¼
Red truck tubes	lb.	.07
Black truck tubes	lb.	.07
Buffings	ton	18.00
Air bags and water bags	ton	——
Boots and shoes	ton	——

Cotton Tire Fabrics

No abatement in the demand for tire fabrics, cotton or rayon, is reported by the trade. Tire manufacturers have placed their orders for first quarter delivery, such orders covering the possible maximum shipments they can secure based on present rates of fabric production. The planned goal of the tire manufacturers to reach a production of 100,000,000 units this year is dependent largely on tire fabric supply. A recent amendment to Rubber Order R-1 permits the use of high-tenacity rayon cord, fabric or yarn, heretofore limited to certain specified uses, for any purpose desired. No changes in price have been reported since our last issue. Current quotations are indicated below:

Standard, Peeler, 12/4/2	lb.	.7405
Standard, Peeler, 14/4/2	lb.	.7542
Standard, Peeler, 16/4/3	lb.	.7680
Extra Staple, Peeler, 12/4/2	lb.	.8370
Extra Staple, Peeler, 14/4/2	lb.	.8508
Extra Staple, Peeler, 16/4/3	lb.	.8646

Chafers

14.4 oz (per sq. yard)	lb.	.7159
9.25 oz. (per sq. yard)	lb.	.7445
11.65 oz (per sq. yard)	lb.	.6444
8.9 oz. (per sq. yard)	lb.	.6873

Sheetings

48x40	36 in.	5.50	yd.	—	@13.276
40x40	36 in.	6.15	yd.	—	@11.890
40x36	36 in.	6.50	yd.	—	@10.723
48x48	40 in.	2.50	yd.	—	@27.594
48x48	40 in.	2.85	yd.	—	@23.075
56x60	40 in.	3.60	yd.	—	@19.229
48x44	40 in.	3.75	yd.	—	@18.830

Cotton

The price of middling uplands on the Cotton Exchange has swung in the wide range of 174 points since our last report (December 11), high for the period being 34.45 on December 26 and low 32.71 on December 12. The average price for middling uplands for the month of December was 33.03, based on 25 trading days. Although the trend of prices was generally upward for the period as a whole, the market exhibited irregularity during the first nine days of the new year. Pessimism on the Exchange was attributed chiefly to the uncertainty over Congressional action to continue support in cotton. The present program favors cotton with a government loan based on 92½ per cent of parity. A lesser factor in the market was President Truman's State of the Union message to Congress, which was considered unsatisfactory by many traders. However, the firm statistical position of cdtton, with 1946 production at a 25-year low of 8,482,000 bales, and a carry-over as of August 1 of only 7,522,000 bales, is expected to be asserted in a gradual advance in prices after mid-January. Quotations for middling uplands on the Exchange follow:

	Dec. 11	January 9		
	Close	High	Low	Close
May	31.23	32.36	32.13	32.15
July	30.17	30.82	30.55	30.56
October	....	27.92	27.68	27.72

Reclaimed Rubber

Despite increasing supplies of natural rubber, and continued relaxation of the regulations covering specifications of permissible end products to permit additional usage of such rubber, the demand for reclaimed rubber continues at peak levels. As in recent months, the demand stems from all branches of the industry, with tire manufacturers in the forefront as many of them attempt to step up production still higher. Consumption of reclaim in October, 1946, amounted to 26,162 long tons, a gain of 10.32% over the 23,715 tons (revised) consumed in September, and of 17.93% over the 22,185 consumed in October, 1945. Shipments of synthetic reclaim are reported to be increasing steadily. No change in prices have been reported since our last issue. Current quotations on typical grades of natural rubber reclaim follow:

Tires

Black (acid process)	lb.	.08½	@	.08¾
Black, selected tires	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.09½	@	.09¾

Shoe

Unwashed	lb.	.08	@	.08¼

Tube

Black Tube	lb.	.12¾	@	.12½
Red Tube	lb.	.13	@	.13¼

Miscellaneous

Mechanical blends	lb.	.05½	@	.06½
White	lb.	.14	@	.14¼

Ducks

Enameling (single filling)	lb.	—	@	69.750
Belting and Hose	lb.	—	@	67.166
Single filling, A grade	lb.	—	@	63.000
Double filling, A grade	lb.	—	@	67.000

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Plastic Scrap

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS											
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule					
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	RE-EXPORTS Long Tons	RE-EXPORTS Total Declared Value	TOTAL NET IMPORTS Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1945:													
Jan.	15,626	11,125,799	31.71	206	134,890	29.18	880	476,377	24.17	16,712	1,316	1,024,712	15,396
Feb.	16,592	11,915,425	32.06	402	262,604	29.15	1,843	1,053,328	25.51	18,837	729	625,824	18,108
Mar.	10,254	7,297,267	31.77	434	283,209	29.13	652	384,518	26.33	11,340	1,979	1,420,759	9,361
Apr.	9,743	6,815,597	31.23	253	164,965	29.15	807	486,473	26.91	10,803	1,560	1,148,184	9,243
May	10,375	7,560,578	32.53	235	153,481	29.15	865	525,953	27.14	11,475	208	145,880	11,267
June	7,991	5,467,478	30.54	692	451,629	29.15	675	412,213	27.26	9,358	456	347,623	8,902
July	9,568	6,973,890	32.54	336	219,469	29.15	605	371,245	27.39	10,509	620	455,658	9,889
Aug.	9,741	6,880,325	31.53	624	407,677	29.15	841	506,655	26.91	11,206	894	824,976	10,312
Sept.	9,870	7,050,795	31.89	626	408,651	29.15	668	409,535	27.38	11,164	406	310,128	10,758
Oct.	10,673	7,645,618	31.98	287	187,422	29.15	646	391,971	27.07	11,606	562	369,296	11,044
Nov.	11,177	7,844,162	31.33	296	193,252	29.15	739	446,925	27.65	12,212	254	179,321	11,958
Dec.	12,844	9,273,507	32.24	382	248,604	29.15	819	498,604	27.20	14,045	525	349,385	13,520
1946:													
Jan.	18,580	13,515,971	32.48	569	371,857	29.15	446	263,279	26.33	19,595	164	41,992	19,431
Feb.	32,690	23,944,266	32.70	...	.....	....	318	171,823	24.10	33,008	723	444,400	32,285
Mar.	31,093	22,520,391	32.33	504	328,905	29.15	160	87,344	24.34	31,757	714	488,044	31,043
Apr.	26,234	18,997,757	32.33	1,001	808,463	36.06	874	467,151	23.86	28,109	392	243,952	27,717
May	4,784	3,314,818	30.93	1,052	687,100	29.11	430	219,830	22.82	6,266	422	419,278	5,844
June	8,518	6,132,895	32.15	561	366,165	29.15	466	244,580	23.41	9,545	460	446,253	9,085
July	20,641	13,947,817	30.17	696	451,523	28.96	291	148,442	22.85	21,628	2,457	1,600,600	19,171
Aug.	34,125	18,656,966	24.41	1,231	803,435	29.14	366	193,680	23.06	35,722	1,515	902,005	34,207
Sept.	41,311	22,317,275	24.12	...	.....	.....	425	219,849	23.09	....	143	81,581	.....
Oct.*	45,523	24,745,403	24.27	672	438,938	29.15	691	377,319	24.38	46,886	649	613,424	46,237
Nov.*	58,756	30,648,620	23.29	130	85,363	29.24	379	200,270	23.58	59,265	60	29,800	59,205

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule. * Estimated.

Natural Rubber
(Including Latex and Guayule)
(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1945:				
Jan.	15,242	11,411	802	97,179
Feb.	20,427	10,228	425	106,953
Mar.	9,146	10,983	1,797	103,319
Apr.	10,046	9,793	867	102,705
May	10,067	10,164	130	102,478
June	9,940	8,995	204	103,219
July	8,739	7,698	756	103,504
Aug.	10,259	7,392	777	105,594
Sept.	12,150	5,799	560	111,385
Oct.	13,984	7,206	78	118,085
Nov.	7,288	7,575	255	117,543
Dec.	7,884	8,185	92	118,715
1946:				
Jan.	25,143	10,355	209	133,294
Feb.	35,104	10,131	290	157,977
Mar.	35,348	12,792	445	180,088
Apr.	19,847	16,914	190	182,831
May	6,126	17,867	327	170,763
June	23,382	16,466	911	176,768
July	14,942	21,998	222	169,490
Aug.	45,087	28,405	592	185,580
Sept.	46,122	31,132	988	199,591
Oct.*	36,735	35,421	106	200,799
Nov.*	55,231	37,296	35	218,699

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Civilian Production Administration. * Estimated.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	..	.....
1944	1,012	660,805	88	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1945:						
Jan.	121	74,964	....	.....	....	.....
Feb.	24	17,441	....	.....	....	.....
Mar.	150	69,291	....	.....	....	.....
Apr.	36	18,486	....	.....	....	.....
May	110	60,465	....	.....	3	3,244
June	8	6,872	....	.....	....	.....
July	228	128,129	....	.....	....	.....
Aug.	154	80,296	....	.....	....	.....
Sept.	49	52,148	....	.....	5	2,196
Oct.	130	83,173	....	.....	....	.....
Nov.	303	257,246	....	.....	10	6,547
Dec.	48	58,742	....	.....	18	9,983
1946:						
Jan.	129	121,228	....	.....	....	.....
Feb.	38	35,699	....	.....	5	2,178
Mar.	100	70,315	....	.....	....	.....
Apr.	362	261,098	....	.....	....	.....
May	325	212,899	....	.....	....	.....
June	80	80,006	....	.....	....	.....
July	219	178,564	115	91,412	7	19,839
Aug.	234	249,380	....	.....	4	13,438
Sept.	159	161,937	4	9,337	23	47,147
Oct.*	282	367,393	21	29,307	305	216,901
Nov.*	152	270,379	28	39,502	3	10,233

Source: U. S. Department of Commerce. * Estimated.

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FRanklin 6139

Synthetic Rubber

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	672	1,699
1942	22,411	.....	17,629	1,419	4,608
1943	231,722	.....	170,891	18,148	47,295
1944	762,630	11,043	566,670	104,266	150,032
1945	820,373	10,407	693,580	83,778	203,454
1945:					
Jan.	79,037	1,040	64,938	9,253	153,170
Feb.	71,530	483	60,400	6,712	160,169
Mar.	77,298	417	63,846	4,664	169,704
Apr.	75,846	751	59,437	6,688	180,487
May	83,309	1,418	62,837	7,435	193,663
June	78,702	1,270	58,627	7,363	203,018
July	78,650	1,428	52,571	12,085	218,369
Aug.	69,703	1,491	54,439	10,856	224,117
Sept.	63,754	928	45,479	3,801	239,683
Oct.	47,317	237	58,667	1,596	226,550
Nov.	48,634	471	56,227	7,984	214,289
Dec.	46,593	473	56,112	5,341	203,454
1946:					
Jan.	56,089	.....	66,993	5,715	177,051
Feb.	51,848	.....	63,770	6,415	144,427
Mar.	60,363	1,429	74,214	17,707	115,310
Apr.	66,014	536	70,703*	12,878*	101,510*
May	66,044	366	70,914	13,102	93,447
June	63,388	415	82,899*	5,161*	94,095*
July	63,176	353	54,562	3,175	101,007
Aug.	64,300	634	61,486	2,175	103,076
Sept.	63,765*	1,031	58,798*	2,480	108,840*
Oct.	62,086	1,149	60,729	474	110,913
Nov.	60,315	894	57,486	1,781	113,874

Source: Civilian Production Administration.
Note: Production figures include the output of privately-owned and government plants. Figures for 1941 are estimated. * Revised.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)[b]	GR-I (Butyl)	Buna N Types[b]	Total
1942	3,721	8,956	.....	9,734	22,411
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946 *	610,000	48,000	80,700	5,700	744,400

Consumption

1942	2,579	6,833	.....	8,217	17,629
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945 *	676,700	48,000	43,700	8,500	776,900
1946 *	630,000	44,500	79,000	6,000	759,500

Exports

1942	222	1,037	.....	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946 *	68,000	2,750	495	1,000	72,245

Stocks at End of Period

1942	1,050	1,786	.....	1,772	4,608
1943	30,975	6,415	1,033	3,145	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946 *	82,000	10,500	18,500	3,500	114,500

Sources: From miscellaneous Government reports.
Notes: (a) Consumption figures for 1945 include exports. (b) Including production of privately-owned plants. (*) Estimated. Revisions of figures in this table are made from time to time and the latest issue should be consulted for accuracy.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1939	1940	1941	1942	1943	1944	1945	1946
Jan.	38,089	40,370	46,190	49,216	36,085	47,540	51,125	51,186
Feb.	34,928	37,557	42,782	42,666	36,274	47,754	49,013	47,889
Mar.	43,042	44,607	49,572	50,820	41,586	52,263	55,449	56,801
Apr.	44,264	47,683	55,879	49,554	48,177	50,005	59,147	62,045
May	49,766	52,946	60,121	53,212	49,828	54,230	60,828	66,774
June	50,133	55,459	59,062	50,077	52,325	54,266	60,597	63,221
July	50,689	53,865	63,906	54,606	49,867	55,119	66,218	69,044
Aug.	54,025	55,346	63,575	48,793	51,880	55,616	70,027	66,701
Sept.	49,505	52,297	59,768	50,093	49,707	56,318	64,550	62,216
Oct.	49,854	53,807	58,412	50,094	53,111	53,154	55,743	66,598
Nov.	47,407	49,074	54,670	50,729	50,703	54,967	53,581	.....
Dec.	43,807	46,413	53,568	39,250	48,695	52,250	50,129	.....
Total	555,509	589,424	667,505	589,110	568,238	633,482	696,407	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude[a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007	254,820	64.6	30,405	42,532
1943	304,058	291,082	59.6	15,678	46,201
1944	260,631	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1945:					
Jan.	21,992	20,777	27.2	1,419	43,628
Feb.	20,131	20,760	29.4	1,055	39,444
Mar.	22,042	22,891	30.6	1,409	37,186
Apr.	20,389	20,234	29.2	1,125	36,216
May	22,249	22,459	30.3	971	35,035
June	20,187	19,873	29.4	996	34,353
July	17,033	15,976	26.5	836	34,574
Aug.	18,804	18,663	30.2	834	33,881
Sept.	17,246	17,365	33.9	1,323	32,439
Oct.	22,044	22,185	33.7	1,195	31,103
Nov.	20,560	20,263	31.8	859	30,541
Dec.	20,632	19,590	30.5	1,391	28,155
1946:					
Jan.	24,458	22,031	28.5	1,253	29,099
Feb.	23,187	20,702	28.0	1,368	30,216
Mar.	25,136	22,075	26.0	1,841	31,436
Apr.	23,930*	22,396*	25.8	1,238	31,732*
May	25,322	22,162	24.9	1,338	33,554
June	24,882*	21,725*	27.4	1,416	35,470
July	22,619	21,350	27.9	961	35,603
Aug.	25,798	24,566	27.3	1,093	35,742
Sept.	23,956	23,715	26.4	579	35,404
Oct.	26,322	26,706	27.7	759	34,261
Nov.	24,802	24,648	26.0	1,108	33,307

Source: 1936-40, Department of Commerce; 1941 to date, Civilian Production Administration. * Revised. (a) Includes natural and synthetic rubber.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1938	2,000,985	485,852	2,486,837
1931	1,973,090	416,648	2,389,738	1939	2,866,796	704,308	3,571,104
1932	1,135,491	235,187	1,370,678	1940	3,692,328	721,637	4,413,965
1933	1,573,512	346,545	1,920,057	1941	3,744,300	875,381	4,619,681
1934	2,177,919	575,192	2,753,111	1942	220,814	133,083	353,897
1935	3,252,244	694,690	3,946,934	1943	0	4,501	4,501
1936	3,669,528	781,862	4,451,390	1944	0	124,819	124,819
1937	3,915,889	892,382	4,808,271	1945	83,792	313,643	397,435
1945							
Jan.	0	15,019	15,019	July	359	31,394	31,753
Feb.	0	14,032	14,032	Aug.	1,381	27,532	28,913
Mar.	0	18,339	18,339	Sept.	580	30,106	30,686
Apr.	0	18,980	18,980	Oct.	16,839	40,900	57,739
May	0	22,315	22,315	Nov.	34,611	53,103	87,714
June	0	23,131	23,131	Dec.	30,022	28,792	58,814
1946							
Jan.	56,367	44,994	101,361	July	209,180	87,454	296,634
Feb.	57,784	34,914	92,698	Aug.	247,261	97,881	345,142
Mar.	85,810	37,636	123,446	Sept.	232,280	95,658	327,938
Apr.	132,631	80,762	213,393	Oct.	283,586	107,154	390,740
May	166,942	75,373	242,315	Nov.	269,081	100,892	369,973
June	141,090	60,038	201,128	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1940	1941	1942	1943	1944	1945
Passenger Car	17,026,812	17,828,994	1,025,880	780,291	1,748,917	4,504,368
Truck & Bus	3,857,316	6,464,725	5,298,603	4,949,004	6,391,441	6,486,652
Agricultural	1,004,319	1,576,720	194,900	301,997	997,301	1,441,909
Earth Mover	2,767	2,593	1,814	945	703	1,308
Total	21,891,214	25,873,032	6,521,197	6,032,237	9,138,362	12,434,237

1946	July	Aug.	Sept.	Oct.	Nov.	Dec.
Passenger Car	1,364,704	1,480,253	1,489,104	1,686,541	1,544,017	1,675,066
Truck & Bus	372,871	501,071	555,870	798,803	756,984	658,268
Agricultural	59,938	119,399	140,558	207,928	154,086	169,465
Earth Mover	311	342	103	2,848	197	334
Total	1,797,824	2,101,065	2,185,635	2,696,120	2,455,284	2,503,133

Source: The Tire & Rim Association, Inc.

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935 (total)	19,263	29,406	1,514	50,183	49,362	8,196
Passenger Car	17,063	26,036	948	44,047	43,256	7,054
Truck and Bus	2,200	3,370	566	6,136	6,106	1,142
1936 (total)	21,446	30,866	1,073	53,385	56,041	10,717
Passenger Car	18,941	26,999	644	46,584	49,013	9,291
Truck and Bus	2,505	3,867	429	6,801	7,028	1,426
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680*	8,872*	207*	15,759*	15,351*	6,247*
Passenger Car	910*	2,734*	38*	3,682*	2,790*	4,432*
Truck and Bus	5,770*	6,138*	169*	12,077*	12,561*	1,815*
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	[illegible]	33,356	33,446	2,013
Passenger Car	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946:						
May (total)	1,259	5,660	112	7,032	7,060	3,377
Passenger Car	895	4,730	51	5,676	5,700	2,386
Truck and Bus	364	930	61	1,356	1,360	991
June (total)	925	5,075	134	6,134	6,036	3,309
Passenger Car	711	4,279	56	5,046	4,921	2,290
Truck and Bus	214	796	78	1,088	1,115	1,019
July (total)	1,529	4,610	107	6,247	5,985	2,891
Passenger Car	1,122	3,840	48	5,010	4,924	2,052
Truck and Bus	407	770	59	1,237	1,061	839
August (total)	1,685	4,997	144	6,825	7,054	3,006
Passenger Car	1,238	4,190	66	5,493	5,791	2,288
Truck and Bus	447	807	78	1,332	1,263	718
September (total)	1,636	5,208	98	6,943	7,233	3,370
Passenger Car	1,188	4,398	40	5,626	5,869	2,586
Truck and Bus	448	810	58	1,317	1,364	784
October (total)	1,874	6,445	114	8,433	8,205	3,041
Passenger Car	1,394	5,474	49	6,917	6,667	2,265
Truck and Bus	480	971	65	1,516	1,538	776

Source: The Rubber Manufacturers Association, Inc. * Revised.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1943:							
Jan.-Mar.	11,155	34,287	7,819	53,261	564	9,833	10,397
Apr.-June	11,625	34,684	8,549	54,858	1,253	10,185	11,438
July-Sept.	15,754	36,854	9,618	62,226	1,220	9,184	10,404
Oct.-Dec.	15,928	42,639	10,464	69,031	1,806	12,055	13,861
Total	54,462	148,464	36,450	239,376	4,843	41,257	46,100
1944:							
Jan.-Mar.	17,135	42,783	11,452	71,370	1,812	15,830	17,642
Apr.-June	17,587	40,580	11,499	69,666	1,353	19,586	20,939
July-Sept.	16,653	38,462	11,055	66,170	1,299	25,915	27,214
Oct.-Dec.	12,982	34,107	10,948	58,037	2,773	33,630	36,403
Total	64,357	155,932	44,954	265,243	7,237	94,961	102,198
1945:							
Jan.-Mar.	16,671	43,835	12,306	72,812	3,726	37,777	41,503
Apr.-June	16,044	42,383	13,604	72,031	4,064	42,476	46,540
July-Sept.	15,136	38,158	14,122	67,416	3,549	42,606	46,155
Oct.-Dec.	15,514	36,442	13,573	65,529	*a*	47,734	47,734
Total	63,365	160,818	53,605	277,788	11,339	170,593	181,932
1946:							
Jan.-Mar.	17,128*	39,377*	15,245*	71,750*	*a*	51,208*	51,208*
Apr.-June	19,622	40,197	18,623	78,442	*a*	52,511	52,511
July-Sept.	17,279	39,261	19,684	76,224	5,102	46,915	52,017

Source: U. S. Bureau of the Census.
Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. * Revised.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1935	19,218	28,095	754	48,067	47,879	8,231
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	n.a.	n.a.	n.a.	13,958	12,568	5,742
1943	6,183	12,373	176	18,732	15,260	2,584
1944	6,461	19,739	190	26,390	26,750	2,823
1945	6,119	33,161	408	39,688	41,102	3,671
1946:						
Jan.	602	3,602	83	4,287	4,640	4,121
Feb.	492	3,806	88	4,386	4,874	4,418
Mar.	764	4,776	109	5,649	5,840	4,519
Apr.	1,113	4,842	124	6,079	6,114	4,190
May	1,268	4,903	107	6,278	6,463	4,373
June	931	4,648	121	5,700	5,710	4,377
July	1,513	4,345	101	5,959	5,702	3,954
Aug.	1,697	5,107	127	6,931	7,032	3,929
Sept.	1,641	4,998	96	6,735	7,287	4,435
Oct.	1,882	6,538	113	8,534	8,087	4,108

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1929	26⅞	15½	20.55
1911	184	114	141.30	1930	16½	7½	11.98
1912	140	108	121.60	1931	8⅝	4¼	6.17
1913	113	59	82.04	1932	4¼	2½	3.49
1914	93	56	65.33	1933	9⅞	2⅞	5.96
1915	79	58½	65.85	1934	15⅞	8¾	12.92
1916	102	55	72.50	1935	13¾	10½	12.37
1917	90	52	72.23	1936	23	13½	16.41
1918	70	40	60.15	1937	26⅛	14	19.39
1919	57	38½	48.70	1938	17⅞	10¼	14.64
1920	56½	16	36.30	1939	24	14⅛	17.57
1921	21¾	11½	16.36	1940	24	18¼	20.10
1922	28⅜	13⅝	17.50	1941	24⅞	19⅛	22.40
1923	37⅛	24¾	29.45	1942	22½	22½	22.50
1924	40⅝	17⅝	26.20	1943	22½	22½	22.50
1925	121	34¾	72.46	1944	22½	22½	22.50
1926	88½	36¾	48.50	1945	22½	22½	22.50
1927	41¾	33	37.72	1946	22½	22½	22.50
1928	41¼	17	22.48				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1939	1940	1941	1942	1943	1944	1945	1946
Jan.	8.94	11.19	10.66	19.85	21.34	20.76	22.36	25.49
Feb.	8.97	11.10	10.87	20.05	21.61	21.34	22.29	26.57
Mar.	9.00	10.90	11.08	20.42	21.98	21.65	22.43	27.52
Apr.	8.87	10.89	11.48	21.10	22.02	21.71	21.88	28.40
May	9.56	10.33	12.97	20.88	21.97	21.63	23.30	28.17
June	9.88	10.72	14.66	19.78	21.92	22.31	23.42	29.89
July	9.71	10.42	16.55	20.27	21.46	22.33	23.27	34.11
Aug.	9.30	9.84	17.06	19.45	21.09	22.11	23.10	36.31
Sept.	9.30	9.69	17.94	19.62	21.10	22.10	23.25	37.59
Oct.	9.24	9.62	17.31	19.79	21.00	22.32	23.85	36.79
Nov.	9.73	9.97	17.21	20.21	20.32	22.13	24.71	31.50
Dec.	10.97	10.18	18.09	20.55	20.32	22.28	25.21	33.03
Average for Year	9.46	10.40	14.66	20.16	21.34	21.89	23.25	31.28

Consumption of Vinyl Resins

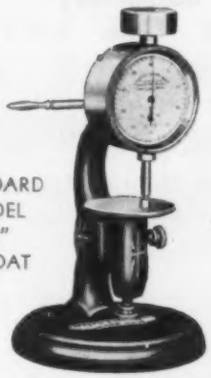
(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [a]	Adhesives [b]	All Other [c]
1946:					
Jan.	1,569	1,650	5,496	399	352
Feb.	1,666	1,035	5,910	390	589
Mar.	2,161	1,689	6,665	....	1,276
Apr.	2,243	1,436	5,265	....	1,804*
May	2,375	1,397	4,666	....	2,188*
June	1,857	1,235	4,978	....	2,402*
July	2,108	2,134	5,512	....	2,972*
Aug.	2,426	2,910	4,874	....	2,733*
Sept.	1,054	3,103	4,886	....	2,792*
Oct.	1,429	3,069	5,349	....	3,098*

Source: Bureau of the Census.
Notes: (a) Includes weight of fillers, plasticizers and extenders; (b) Resin content; (c) Excludes data for protective coating resins. * Includes Adhesives.

RANDALL & STICKNEY

THICKNESS GAUGES FOR RUBBER



STANDARD MODEL 1¾" THROAT

THROAT DEPTHS
1¾" to 26"
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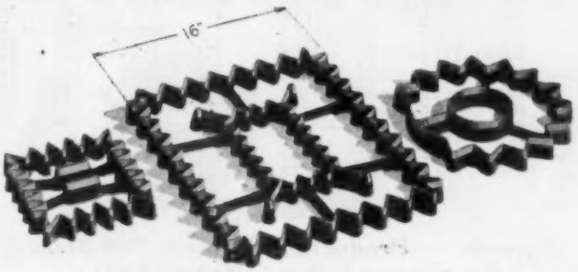

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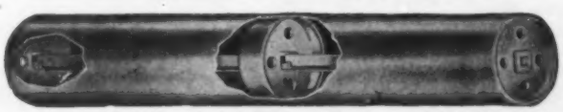

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

Month	1945 All Rubber Products Number	1945 All Rubber Products Index	1945 Rubber Tires & Tubes Number	1945 Rubber Tires & Tubes Index	1946 All Rubber Products Number	1946 All Rubber Products Index	1946 Rubber Tires & Tubes Number	1946 Rubber Tires & Tubes Index
Jan.	199	164.9	97	178.5	209	172.7	99	182.4
Feb.	200	165.1	96	178.0	214	177.1	101	187.3
Mar.	209	173.2	96	176.8	220	181.5	104	191.6
Apr.	205	169.6	93	172.2	220*	182.0*	104	192.8
May	201	166.6	92	169.2	221*	182.7*	105	193.4
June	199	164.5	90	166.7	225	186.1	106	195.8
July	194	160.5	88	162.1	218	180.2	99	183.1
Aug.	191	158.0	86	159.3	227*	187.5*	103	189.9
Sept.	165	136.5	72	132.7	230	190.1	104	192.2
Oct.	187	154.4	88	163.0	236	195.1	...	....
Nov.	194	160.1	91	168.9	...	....	...	....
Dec.	203	168.2	96	177.8	...	....	...	....

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	291.0	288.9	323.2	342.4	290.1	272.6
Feb.	295.7	295.6	323.6	339.8	292.1	271.9
Mar.	297.0	299.3	315.4	301.9	302.8	281.1
Apr.	281.3	280.0	315.9	306.0	324.9	312.9
May	283.3	283.0	299.8	288.6	327.6	314.2
June	281.4	278.5	304.3	293.8	337.2	318.3
July	279.7	280.9	298.7	286.8	327.2	304.3
Aug.	291.0	294.3	265.7	249.7	343.2	311.2
Sept.	294.5	300.8	231.3	211.4	365.0	340.5
Oct.	293.3	297.5	254.2	239.8	....	....
Nov.	293.6	298.2	257.8	240.2	....	....
Dec.	308.5	319.4	275.5	256.7	....	....

Wages — Average Weekly Earnings

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	$48.18	$55.79	$54.49	$64.29	$46.71	$50.29
Feb.	48.95	57.21	54.40	64.04	46.05*	49.21*
Mar.	49.53	58.38	50.62	57.29	46.46*	49.72
Apr.	48.12	55.63	51.93	59.75	49.67*	54.77*
May	48.98	57.11	50.09	57.32	49.82	54.72
June	49.30	56.78	51.45	59.20	50.45	54.82*
July	49.17	57.01	51.81	59.59	50.60	56.11
Aug.	50.24	58.62	46.76	52.81	51.04	55.43
Sept.	50.99	59.33	47.20	53.59	53.60	59.91
Oct.	50.92	58.54	45.57	49.48	....	....
Nov.	50.59	58.30	44.68	47.78	....	....
Dec.	52.64	61.62	45.49	48.54	....	....

Wages — Average Hourly Earnings

Month	1944 All Rubber Products	1944 Rubber Tires & Tubes	1945 All Rubber Products	1945 Rubber Tires & Tubes	1946 All Rubber Products	1946 Rubber Tires & Tubes
Jan.	$1.066	$1.224	$1.151	$1.317	$1.121	$1.255
Feb.	1.072	1.240	1.149	1.314	1.129	1.266
Mar.	1.086	1.256	1.117	1.260	1.138	1.275
Apr.	1.075	1.234	1.136	1.294	1.232*	1.414*
May	1.087	1.257	1.132	1.284	1.266	1.446
June	1.092	1.254	1.140	1.307	1.283*	1.461*
July	1.094	1.256	1.138	1.296	1.292	1.472
Aug.	1.102	1.264	1.119	1.269	1.296	1.477
Sept.	1.117	1.273	1.098	1.243	1.320	1.505
Oct.	1.108	1.263	1.100	1.231	....	....
Nov.	1.107	1.258	1.112	1.249	....	....
Dec.	1.130	1.290	1.113	1.247	....	....

Hours — Average Weekly Hours per Worker

Month	1944	1945	1946	Month	1944	1945	1946
January	45.2	47.3	41.7	July	45.0	45.5	39.2
February	45.7	47.3	40.8*	August	45.6	41.8	39.4
March	45.6	45.3	40.8*	September	45.7	43.0	40.6
April	44.7	45.7	40.3	October	45.9	41.4	...
May	45.1	44.2	39.4	November	45.7	40.2	...
June	45.2	45.2	39.3	December	46.6	40.9	...

Source: U. S. Department of Commerce. * Revised.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1944	1945	1946	Month	1944	1945	1946
Jan.	242	247	215	July	227	218	211
Feb.	244	247	216*	Aug.	231	193	221*
Mar.	242	236	221*	Sept.	230	172	231
Apr.	231	233	219*	Oct.	231	191	237
May	230	224	215*	Nov.	231	192	...
June	228	222	218	Dec.	239	205	...

Shipments—Average Month 1939 = 100 (Based on $ Value)

Month	1944	1945	1946	Month	1944	1945	1946
Jan.	274	311	229	July	295	274	268
Feb.	299	351	242	Aug.	288	255	282
Mar.	290	351	260	Sept.	297	200	311
Apr.	295	356	282	Oct.	342	260	...
May	293	333	288	Nov.	293	212	...
June	316	333	293	Dec.	341	292	...

Inventory — Average Month 1939 = 100 (Based on $ Value)

Month	1944	1945	1946	Month	1944	1945	1946
Jan.	179.6	170.6	173.7	July	174.7	183.3	195.0
Feb.	185.2	176.7	179.9	Aug.	172.9	182.4	198.0
Mar.	187.6	175.5	186.4	Sept.	174.3	177.4	204.0
Apr.	190.6	175.3	198.5	Oct.	174.3	167.7	....
May	188.1	178.3	195.5	Nov.	176.1	167.1	..
June	182.1	178.7	192.4	Dec.	169.6	169.0	....

Source: U. S. Department of Commerce. * Revised.

Various Compounding Materials Consumed by the Rubber Industry

Material	1939	1940	1941	1942	1943	1944	1945
Asphalt [a]							
Short tons	24,293	22,772	20,536	22,263	16,510	20,189	19,483
% of total	1.0	0.9	0.6	0.6	0.5	0.6	0.5
Barite (Barytes):							
Short tons	3,319	4,283	9,800	6,334	8,000	10,000	10,000
% of total	2.0	2.3	4.2	3.6	3.9	2.9	2.1
Carbon Black:							
Short tons	158,311	155,090	219,751	147,974	236,737	369,015	402,193
% of total	56.5	58.5	68.2	65.8	75.2	78.7	78.9
Clay, Kaolin:							
Short tons	90,287	92,640	127,055	51,334	50,964	59,588	109,936
% of total	11.6	11.1	11.6	5.1	5.5	6.8	11.7
Clay, Fire & Stoneware:							
Short tons	3,770	10,104	9,000	5,000	10,259	7,160	7,800
% of total	0.2	0.4	0.2	0.1	0.2	0.1	0.1
Lead Sulfate, Basic:							
Short tons	140	128	200	89	131	268	200
% of total	2.5	2.1	1.9	1.1	2.3	4.2	5.2
Lime:							
Short tons	1,357	1,879	3,058	1,381	2,039	5,634	7,170
% of total	0.03	0.03	0.05	0.02	0.05	0.13	0.10
Litharge:							
Short tons	1,404	1,590	3,968	3,460	4,302	3,023	1,864
% of total	1.6	1.8	3.3	3.8	3.8	2.2	1.3
Lithopone:							
Short tons	3,189	3,387	3,547	1,047	1,078	726	977
% of total	2.2	2.2	2.0	0.8	0.8	0.5	0.7
Mica, Ground:							
Short tons	2,539	1,731	3,476	1,754	3,063	1,137	3,715
% of total	8.2	6.2	8.0	3.7	6.0	2.2	7.0
Sulfur:							
Short tons	49,000	54,000	63,000	40,000	51,000	63,000	64,960
% of total	2.5	2.5	2.4	1.4	1.8	1.9	2.0
Talc [b]							
Short tons	31,078	28,501	58,114	40,487	48,994	51,833	62,049
% of total	12.4	10.0	13.9	10.0	11.8	13.0	15.0
Zinc Oxide:							
Short tons	70,187	70,979	90,429	52,717	67,898	59,518	63,447
% of total	61.3	62.8	63.4	53.0	47.4	42.3	49.6

Source: U. S. Bureau of Mines.

Notes: [a] Solid and semi-solid products of less than 200 penetration. [b] Includes pyrophyllite and ground soapstone.

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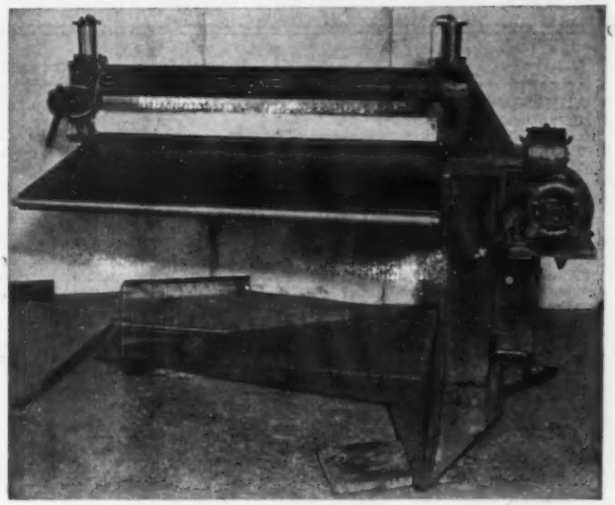

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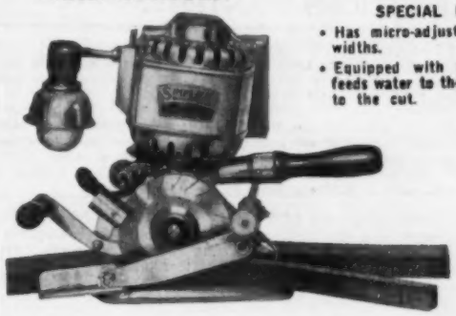

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ENGINEER, age twenty-five to thirty-five, with some mechanical goods production and engineering experience. This is an unusual opportunity in mechanical rubber products of a highly specialized nature. Etxensive experience not absolutely necessary. Address Box 2300, RUBBER AGE.

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PRODUCTION SUPERVISOR, experienced in hard rubber compounding and molding. Must have training or experience in plant engineering and administration. Plant located on West Coast. Position offers right individual an excellent opportunity. Address Box 2325, RUBBER AGE.

DEVELOPMENT CHEMIST, young, with several years' experience in rubber industry for development work on synthetic rubbers, adhesives, plastics used in fabric coatings. Excellent opportunity. Metropolitan New York area. In reply give complete resume and minimum salary requirements. Enclose small photo. Address Box 2382, RUBBER AGE.

LEADING MANUFACTURER OF V-BELTS needs experienced engineer with knowledge of manufacture, construction, and testing of V-Belts. Job involves heading physical testing section of laboratory in addition to duties on V-Belts. Unusual opportunity for right man with progressive company. In reply state age, education, and business experience. Address Box 2346, RUBBER AGE.

CALENDER OPERATOR: Firm in northern New Jersey requires experienced man for night shift. Give particulars as to experience and compensation expected. Address Box 2364, RUBBER AGE.

COMPOUNDING CHEMIST wanted to organize and assume complete management and product development of new rubber company. Must be resourceful and creative in wide line of rubber products. Very liberal profit-sharing arrangements will be made for the right man. Vicinity Philadelphia. Give details and references in reply. Address Box 2366, RUBBER AGE.

PLANT SUPERINTENDENT for a progressive rubber plant located in central New Jersey. Give complete resume including experience, qualifications, and salary requirements. Prefer man between thirty-five and forty-five years of age. Address Box 2369, RUBBER AGE.

HELP WANTED (Continued)

ADHESIVE CHEMIST, with experience in compounding natural and synthetic rubber latices, wanted by a well-established firm in Boston area to take full charge of production. Company is progressive and offers excellent opportunity for advancement. Salary commensurate with training and experience. Applicants are requested to submit full details concerning their qualifications. Replies held confidential. Address Box 2372, RUBBER AGE.

WANTED: A thoroughly experienced man to organize and operate a very small plant manufacturing rubber heels and soles. He must be thoroughly familiar with all technical details of manufacture and know where to obtain machinery and how to install it. This will be a new department of an old established company in another line. Please give full details of experience, compensation desired, and other pertinent information. Address Box 2373, RUBBER AGE.

FACTORY MANAGER for plant manufacturing consumer products made from plastic film. Must be experienced in manufacturing methods in this field. Knowledge of heat sealing essential. Will be completely responsible for organizing and functioning of the plant, including production, labor relations, safety, etc. The plant location is not yet definite but probably Montclair, Dover, or Greenwich. Write fully. Address Box 2377, RUBBER AGE.

LEADING EASTERN RUBBER MANUFACTURER needs young engineer knowing mechanical rubber goods compounding and manufacturing techniques. Excellent opportunity for right man. In reply state age, education, and business experience. Address Box 2347, RUBBER AGE.

SALESMAN to represent New Jersey rubber company making mechanical rubber goods on full time basis. Salary commensurate with ability. Address Box 2370, RUBBER AGE.

PROGRESSIVE AND LONG ESTABLISHED rubber heel and sole manufacturer requires the services of an experienced rubber chemist and compounder, some knowledge of plastics in rubber heels and soles required. Reply giving age, experience, and state salary expected. All replies will be considered confidential. Plant is located in Boston district. Address Box 2389, RUBBER AGE.

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INDEX TO ADVERTISERS

A

Adamson United Co. 423
Adhesive Products Corp. ..... —
Advance Solvents & Chemical Corp. 432, 480
Agawam Chemicals, Inc. 491
Akron Standard Mold Co. 426
Albert & Son, L. 499
American Anode Inc. 409
American Cynamid Co.
Calco Chemical Division 405
American Zinc Sales Co. 410
Atlas Electric Devices Co. ..... —
Autoclave Engineers Inc. ..... —

B

Baird Rubber and Trading Co. ..... —
Baker Castor Oil Co. ..... —
Baker Chemical Co., J. T. 493
Barrett Div. Allied Chemical & Dye Corp. .. 422
Beacon Co. 429
Berlow & Schlosser Co. 493
Binney & Smith Co. ..... Insert Following 466
Black Rock Mfg. Co. ..... —
Bonwitt, Eric 499
Brockton, Cutting Die & Machine Co. ..... —
Brown Co. ..... —

C

Cabot, Godfrey L., Inc. ..... Insert Following 396
Caldwell Co., The 491
Cambridge Instrument Co. 480
Cameron Machine Co. ..... —
Carbide & Carbon Chemicals Corp. ..... —
Carter Bell Mfg. Co., The 481
Chipco, Inc. ..... —
CLASSIFIED ADVERTISING 498, 499
Cleveland Liner & Mfg. Co. ..... Back Cover
Columbian Carbon Co. ..... Insert Following 466
Connor, Charles F., & Co., Inc. ..... —
CONSULTANTS SECTION 499
Continental Carbon Co. ..... —
Continental Machinery Co. 491
Continental-Mexican Rubber Co. ..... —

D

Dow Corning Corp. 402, 485
Du Pont de Nemours & Co., E. I. ..... Inside Front Cover

E

Emerson Apparatus Co. 483
English Mica Co. 486
Erie Engine & Mfg. Co. 434
Enjay Co., Inc. 425

F

Farrel-Birmingham Co., Inc. 394
Fintkote Co., The ..... —

G

Gammeter, W. F., Co. 495
General Aniline & Film Corp. ..... —
General Atlas Carbon Co. 404
General Chemical Co. ..... —
General Latex & Chemical Corp. 406
General Magnesite & Magnesia Co. 432
Genseke Brothers 428
Gidley, Philip Tucker 499
Goodrich, B. F., Chemical Co. (Chemicals) . 392
Goodrich, B. F., Chemical Co. (Geon) 391
Goodrich, B. F., Chemical Co. (Hycar) 389
Goodyear Tire & Rubber Co. ..... —

H

Hall Co., The C. P. 407
Hardesty Chemical Co., Inc. ..... —
Harwick Standard Chemical Co. 425
Hercules Powder Co., Inc. ..... —
Herron Bros. & Meyer ..... —
Heveatex Corporation 487
Hoggson & Pettis Mfg. Co. ..... —
Holliston Mills, Inc. ..... —
Howe Machinery Co., Inc. 495
Huber, J. M., Inc. 436
Hydraulic Press Mfg. Co. ..... —

I

Independent Die & Supply Co. 495
Industrial Ovens, Inc. 495
Interstate Welding Service ..... —

J

Jacoby, Ernest & Co. 493
Jeffrey Mfg. Co. ..... —
Johnson Steel & Wire Co., Inc. 495

K

Karman Rubber Co. 497
Keasbey & Mattison Co. 433

L

Littlejohn Co., Inc. ..... —
Loewenthal Company ..... —

M

Magnetic Gauge Co. ..... —
Marbon Corp. ..... —
Mercer-Robinson Mfg. Co. 482
Meyer & Brown, Inc. 491
Milne, Gordon, Rubber Co. ..... —
Monsanto Chemical Co. 427
Moore & Munger 402
Mt. Vernon-Woodbury Mills, Inc. 393
Muehlstein & Co., H., Inc. 396
Mumper, James F., Co. 499

N

National Lead Co. 412
National Rosin Oil & Size Co. 487
National Rubber Machinery Co. ..... —
National Sherardizing & Machinery Co. 495
National-Standard Co. ..... —
Naugatuck Chemical, U. S. Rubber Co. 438
Neville Co. ..... —
New Jersey Zinc Co. 435

O

Oak Rubber Co. 493
Olin Laboratories, The R. R. 499

P

Pennsylvania Industrial Chemical Corp. .... —
Pequanoc Rubber Co. 424
Phillips Petroleum Co. 390
Pittsburgh Corning Corp. ..... —
Pittsburgh Plate Glass Co., Columbia Chemical Div. ..... —
Polymel Corporation ..... —
Powdered Material Research Labs. 499
Precision Scientific Co. ..... —
Preco Incorporated 480
Preventive Maintenance Co. 491
Procter & Gamble 486

R

Rand Rubber Co. 497
Randall, Frank E., Co. 495
Rare Metal Products Co. 497
Rayon Processing Co. of R. I., The ..... —
Reinhold Publishing Corp. ..... —
Renfrew & Kuffler 497
Resinous Products & Chemical Co. 411
Revertex Corp. of America 489
Ridbo Laboratories, Inc. ..... —
Robinson Mfg. Co. 482
Rohm & Haas Co. ..... —
Rotex Rubber Co., Inc. 493
Royle & Sons, John 483

S

St. Joseph Lead Co. 420
Schrader's Son, A. 408
Schulman, A., Inc. ..... Inside Back Cover
Scott Testers, Inc. 495
Sharples Chemicals, Inc. 419
Shell Oil Co., Inc. 415
Simplex Cloth Cutting Machine Co., Inc. 497
Skelly Oil Co., Solvents Div. ..... —
Snell, Foster D., Inc. 499
Spadone Machine Co. ..... —
Stamford Rubber Supply Co. 500
Standard Oil Co. (Indiana) 431
Stauffer Chemical Co. 487
Stearns Magnetic Mfg. Co. ..... —
Sun Oil Co. 403
Symons, Ralph B. ..... —

T

Tanney-Costello Co. 489
Taylor Instrument Companies ..... —
Textile Proofers, Inc. 479
Thropp & Sons, William R. 482
Titanium Pigment Corp. ..... —
Turner Halsey Co. 393

U

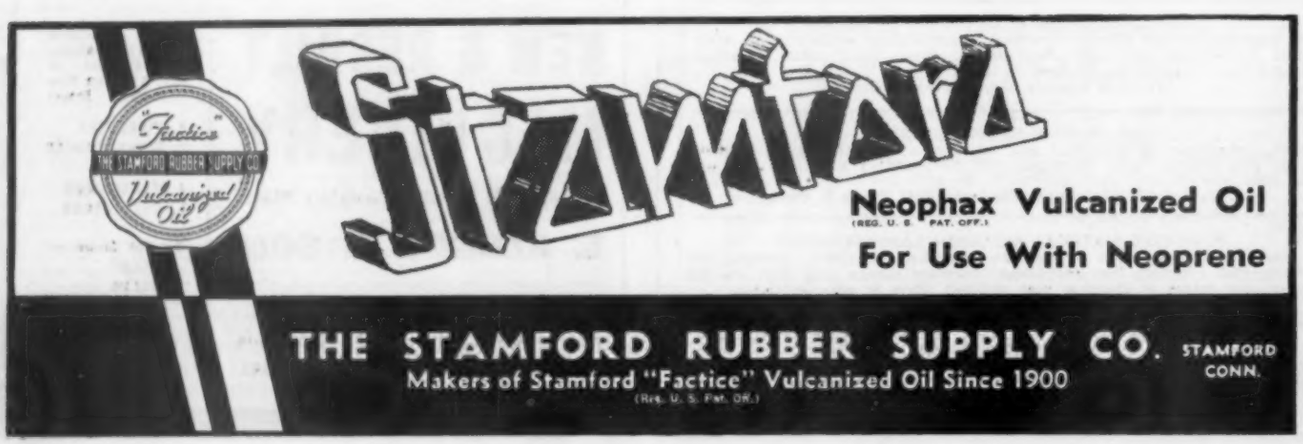
Union Bay State Chemical Co. ..... —
Union Carbide & Carbon Corp. ..... —
Union Pacific Railroad 416
United Carbon Co. ..... Insert Following 416
United Engineering & Foundry Co. ..... —
U. S. Rubber Reclaiming Co. 395
Utility Mfg. Co. 497

V

Vanderbilt, R. T., Co. ..... Front Cover

W

Waldron Corp., John ..... —
War Assets Administration ..... —
White, J. J., Products Co. 434
Whittaker, Clark & Daniels, Inc. ..... —
Williams, C. K. & Co. 493
Wire & Textile Machinery Inc. 497
Witco Chemical Co. 413



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